NUS CORPORATION
A Halliburton Company

36753

36753

FINAL DRAFT
SITE INSPECTION REPORT
LI TUNGSTEN
GLEN COVE, NEW YORK
VOLUME 2 OF 5

FIELD INVESTIGATION TEAM ACTIVITIES AT UNCONTROLLED HAZARDOUS SUBSTANCES FACILITIES — ZONE I

NUS CORPORATION
SUPERFUND DIVISION

100488

02-9003-01-SI
REV. NO. 0

FINAL DRAFT
SITE INSPECTION REPORT
LI TUNGSTEN
GLEN COVE, NEW YORK
VOLUME 2 OF 5

PREPARED UNDER

TECHNICAL DIRECTIVE DOCUMENT NO. 02-9003-01
CONTRACT NO. 68-01-7346

FOR THE

ENVIRONMENTAL SERVICES DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

SEPTEMBER 28, 1990

NUS CORPORATION
SUPERFUND DIVISION

REFERENCE NO. 13

0055F
02-9003-21

NUS CORPORATION

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100491

LI TUNGSTEN #1
02-9003-01
TDD MANAGER - S. OKULEWICZ
LOGBOOK #0541
MARCH 7, 1990

100492

Li TUNGSTEN
02-9003-01

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THIS IS 1 OF 3 LOG BOOKS FOR
Li TUNGSTEN

[signature] 5/2/90

* DOSIMETERS AND LUDLUM MICRO R PER HOUR METER SUPPLIED BY ELMER BURD OF NUS FIT PITTSBURGH PA. OFFICE.

VICTOREEN RADIATION DETECTOR READS IN MR/HR; LUDLUM DETECTOR READS IN μR/HR.

POCKET DOSIMETER #	PERSON	TIME ON/TIME OFF
#14 — 110-46-8327	STEVE OKULEWICZ	0850/1530
#7- 194-444478	ROBERT CARSON	
#6- 082-64-9762	JOE FILOSA	
#13- 169-24-9409	ELMER BURD	
#16- 175-54-8379	PAUL BAUER	
#2 BACKGROUND CONTROL	~~085~~ SJ	

Steve O'Reilly 3/23/90

100494

CHK METER
PLT

MR/HR;

ME ON/TIME OFF
0850 / 1530

LI TUNGSTEN
02-9003-01 ~~3/23/90~~ 3/23/90

SITE RECONNAISSANCE

NUS PERSONNEL ON SITE		RESPONSIBILITY
STEVEN OKULEWICZ	SO	SITE MANAGER
PAUL BAUER	Paul Bauer	SITE SAFETY OFFICER
JOE FILOSA	Joe Filosa	SURVEILLANCE
ROBERT CARSON	Robert Carson	SITE SAFETY SUPPORT
ELMER BURD	E Burd	SITE SAFETY SUPPORT

ALL ABOVE PERSONNEL HAVE READ AND UNDERSTAND THE WORK PLAN.

	BACKGROUND READINGS
OVA F # 307137	0PPM - ZEROED TO 1 PPM
HNU C # 307140	0PPM
50 ~~MINI RAD #~~	~~COUNTS/MIN~~
VICTOREEN RADIATION DETECTOR #192089	0.02 mR/h BACKGROUND

ARRIVED ON SITE 0830

WEATHER: SUNNY, 50°F, WIND, 0 TO 5 MPH OUT OF SW

MET WITH FARROKH JAHANDARI - CONSULTANT OF FRED HART ASSOCIATES

SET UP DECON AREA WITHIN MAIN GATE OF FACILITY; SIGNED IN WITH SECURITY GUARD; PERSONAL RADIATION

* DOSIMETERS GIVEN TO ALL NUS PERSONNEL FOR RADIATION MONITORING BY ELMER BURD - NUS PITTSBURGH

S. Okulewicz 3/23/90 R P ... 4/30/90

100495

HART

Farrokh Jahandari
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New York, NY 10016
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Fax (212) 447-1495

LI TUNGSTEN
02-9003-01 3/~~23~~/90 22 4/23/90

0920 - TAILGATE SAFETY MEETING HELD BY PAUL BAUER ON SITE; BEGIN TO SUIT UP FOR RECON
0945 - FINISH SUITING UP, BEGIN RECON IN MAIN PART OF FACILITY BY MAIN ENTRANCE

0950 1S/1P ~~NORTH~~ SOUTHWEST 50 VIEW OF STACKED DRUMS CONTAINING PCB OIL TAKEN FROM TRANSFORMERS ON SITE

0955 2S/2P ~~NORTH EAST~~ WEST 50 VIEW OF RUSTED & LEAKING DRUMS OF PROCESSED WASTE ORE OUTSIDE DICE BUILDING
1000 3S/3P ~~WEST~~ NE 50 4/25/90 VIEW OF ~~CRATES OF~~ ORE & DRUMS ALONG ~~WESTERN~~ FRONT OF DICE BLDG.
NO READINGS ABOVE BACKGROUND ON HNU / OVA OR VICTOREEN RAD METER
BLACK PILES 30-45 μR/H FROM WASTE ORE FROM RUSTED OPEN DRUMS, READINGS ONLY FROM CLOSE PROXIMITY TO DRUMS
1005 4S/4S RUSTED & OPEN DRUMS OF PROCESSED ORE LOOKING ~~SOUTH~~ NORTH 50 BEHIND CARBIDE BUILDING

NO RAD READINGS ON ANY TANKS - FRED C. WAT REP

SITE IS LITTERED WITH RUSTED DRUMS, MANY ARE LEAKING BLACK ORE TO GROUND

1010 60 μR/H FROM DRUMS BY WASTE WATER TREATMENT SECTION; BACKGROUND HERE IS 4X RAD COUNT OF ROAD

TANK 35 - pH 14 TANK PARTIALLY FULL
1015 50 4P/4S 5 5 ~~SOUTH~~ NORTH 50 VIEW OF TANK 35 & POOL OF RAIN WATER

[illegible] [illegible] 3/[illegible] [illegible]

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LI TUNGSTEN
02-9003-01 3/~~20~~ 23/90 (50) 3/23/90

1020 - 170 μR/Hr DRUMS AGAINST WALL BY WASTE WATER TREATMENT AREA - SHINGLES OF BLDG MADE OF ASBESTOS MATERIAL

1022 250 μR/HR FROM STACKED DRUMS BY WASTE WATER TREATMENT, SOUTH WEST VIEW OF RUSTED DRUMS OF PROCESSED ORE MATERIALS THAT HAVE 250 μR/HR RADIATION READINGS
6/6S ~~5/155~~ (50)

1025 7 6/6S ~~NORTH~~ SOUTH (50) VIEW OF SUMPS ON ~~EASTERN~~ WESTERN (50) PART OF DIGE ~~BLDG~~ - FILLED WITH RAINWATER

WELLS EMW 3/5: NEED WRENCH - 3/4 HEX NUTS TO OPEN MOUNTED FLUSH WITH GROUND

1045 NO READINGS ABOVE BACKGROUND ON OUR HNU NORMAL BACKGROUND - 9 μR/H ON RAD METERS

POSSIBLE WATER SAMPLES FROM FLOODED FLOOR OF WAREHOUSE AND ≈ APPROX 1 FOOT OF STANDING H_2O IN BLDG CONTAINING HUGE AMTS OF ORE IN BARRELS/DRUMS - MOVE TOWARDS WASTE WATER TREATMENT AREA.

1050 BLACK STAINED SOIL BY NORTH END OF WASTE WATER TREATMENT SUMPS - 5 PPM ON OVA, 4.5 ON HNU

1100 30 GALLON DRUMS AND LEAKING. WOODEN TANK NO. 32 ON (FUEL TANK) CORNER OF HEAP HILL & DICKSON LOOKING ~~SOUTH~~ NORTH (50)
~~6H65~~ (50) 8 P/8S

0.3 mR/HR AROUND WOODEN TANKS ON WESTERN ~~EASTERN~~ HALF OF HEAP HILL RD.
(50) 3/23/90

[signature] 3/23/90 [signature] 4/23/90

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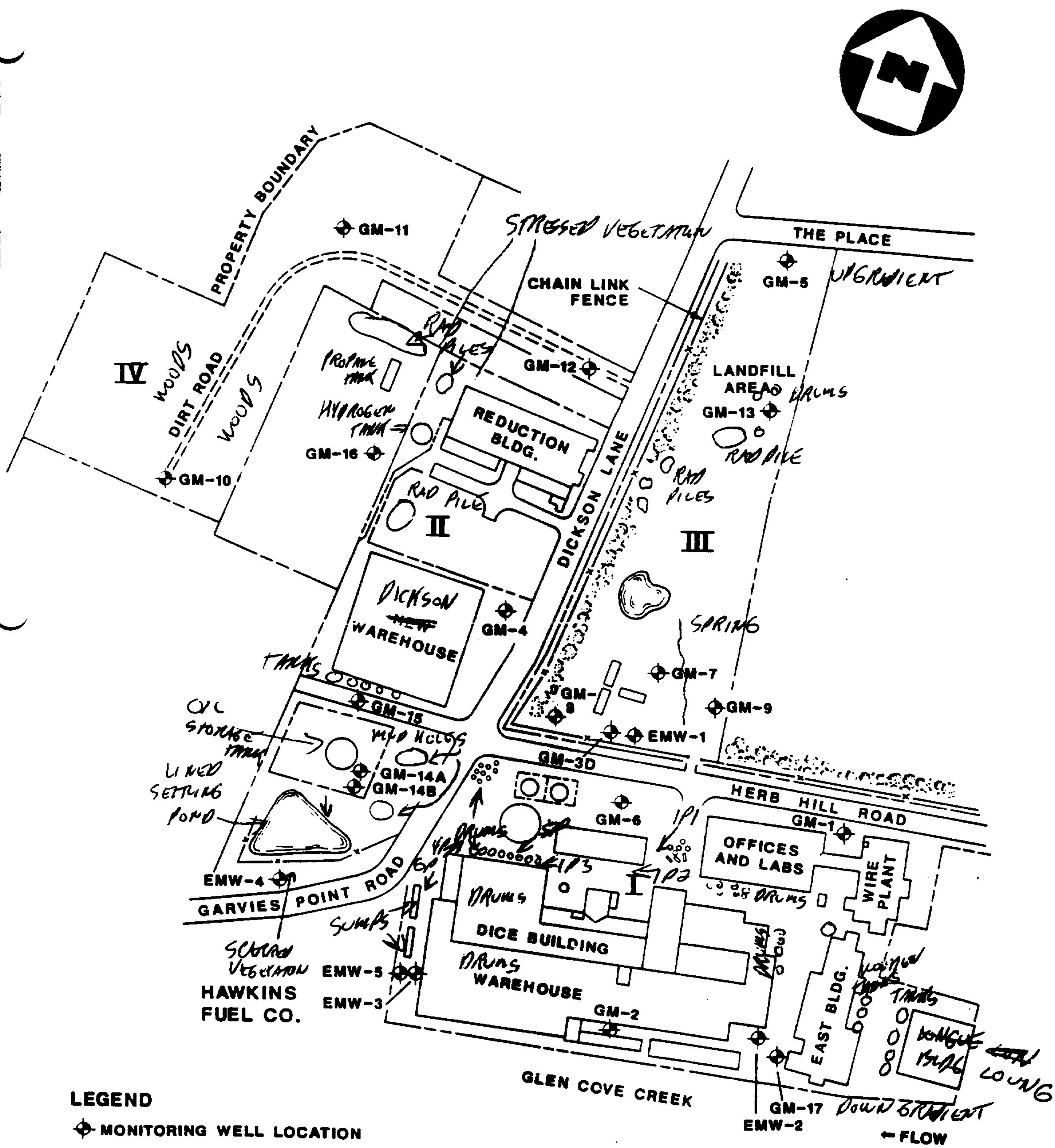

MONITORING WELL LOCATION MAP

FIGURE 3

LI TUNGSTEN, GLEN COVE, LONG ISLAND, N.Y.

NUS CORPORATION

NOT TO SCALE

3/23/90

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LI TUNGSTEN
02-4003-01 3/~~23~~/90 ~~20~~ 3/23/90

1105 9P/95 ~~EAST~~ WEST VIEW OF CORNER OF ~~[illegible]~~ HILL RD & DICKSON WHERE RADIOACTIVE ORE WAS REMOVED AND STAGED IN WAREHOUSE BLDG

1120 38 TRANSFORMERS - ONLY 3 HAD PCB CONTAMINATED OIL ACCORDING TO CONSULTANT

1125 MOVE TO ~~WESTERN~~ EASTERN AREA OF MAIN COMPLEX - LAB BUILDINGS, WIRE PLANT, EAST BLDG, & LOUNG BLDG LOUNG

1135 ~~9P/95~~ 10P/105 ~~SOUTH~~ NORTH VIEW OF WIRE PLANT AND LABS, DRUMS IN ~~BACK~~GROUND FORE

LAB HAD 22 GAS CYLINDERS REMOVED THAT CONTAINED H_2S, SO_2, NO_2, N_2O, NH_3 GASSES ACCORDING TO ON SITE HART-REPRESENTATIVE

1140 50 µR/H ON DRUMS ~~AT~~ ACROSS FROM LABS ON WOODEN TANKS - 0.12 mR/HR RAD READING ACROSS FROM LAB BLDGS. CONTAIN SPENT ACIDS pH=1 ACCORDING TO CONSULTANT

1145 0.3 mR FROM CONTAINERS WITHIN LAB - BUCKETS/CRATES IN FRONT OF DICE BUILDING
MOST TANKS HAVE OPEN TOPS - SOME HAVE RUSTED VALVES - DIFFICULT TO SAMPLE, TANKS ARE UNSTABLE, LADDERS ARE UNSTABLE

1150 ~~4P/45~~ LARGE EMPTY PROCESS TANKS OUTSIDE
11P/115 LOUNGE BLDG LOOKING EAST; TANKS ARE MADE OF WOOD, STAINLESS STEEL, AND FIBERGLASS; THESE TANKS HAVE OPEN TOPS AND CONTAIN RAINWATER AND SOME CHEMICALS

[illegible] PCI PTI 4/20/[illegible]

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LI TUNGSTEN
02-9003-01 3/22/90

1700 ~~10P/10S~~ 12P/12S (50) VIEW OF FRIABLE ASBESTOS PIPE WRAPPING AROUND PIPES OUTSIDE OF LONGUE BUILDING LONGUE BUILDING HAS MUCH ASBESTOS INSIDE IN PIECES ON FLOOR & HANGING FROM PIPES
HIGH PHYSICAL HAZARDS TO SAMPLE TANKS - MANY ARE EMPTY, OTHERS FULL OF RAIN WATER

1705 ~~11P/11S~~ 13P/13S (50) GMW-17 - FLUSH WITH GROUND - NEED SPECIAL WRENCH TO OPEN METAL CAP
1706 ~~12P/12S~~ NORTH VIEW OF AREA ALONG EAST BLDG.
14P/14S (50) WHITE HORIZONTAL TANK CONTAINS AMMONIA, OTHERS ARE EMPTY OR FULL OF RAINWATER ACCORDING TO CONSULTANT
1720 ~~13P/13S~~ 15P/15S INSIDE WAREHOUSE BLDG - ORE DRUMS CONTAINING REMAINING RAW & PROCESSED ORE - SOLID CHUNKS / BLACK POWDER
NO READINGS ABOVE BACKGROUND ON HNU / OVA
NO ABOVE BACKGROUND READINGS ON RAD METER

1745 RETURN TO COMMAND POST FOR DECON AND TAKE A BREAK

1315 HNU / OVA BOTH DEAD; NOW USING OVA E;
1317 HNU BACK TO LIFE LOOSE CONNECTION

1320 LEAVE FOR AREA III ACROSS FROM MAIN BLDG
GM-9 LOCK RUSTED, CANNOT OPEN WITH KEY; NEED WD 40 TO OPEN LOCK ON CASING
1330 AREA CONTAINS 6 WELLS, LARGE EMPTY TANKS;
pH OF RUNOFF = 6, FROM SPRING IN AREA TAKEN WITH pH PAPER, SPRING RUNOFF EMPTIES INTO STORM DRAIN ALONG ROAD → HERB HILL RD

[illegible] 3/22/90 [illegible] 4/12/90

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LI TUNGSTEN 3/22/90
02-9003-01

1335 TANKS IN AREA III ARE EMPTY - RUSTED OUT
AREA CONTAINS MUCH ASH & CLINKER ON GROUND
SOME SOIL SAMPLES SHOULD BE TAKEN HERE
0.05-0.06 mR/HR
AREA AROUND RUSTED TANKS IN BACK HAS
3-4X BACKGROUND RADIATION - SUSPECTED RADIOACTIVE
WASTE ORE BURIED OR DUMPED HERE

1345 MOVE ALONG ROAD TO WASTE PILES BEHIND AREA III
15 uR/HR ALONG FENCE ON DICKSON LANE; ENTERING
GATE ALONG DICKSON LANE

1347 MOVE IN BLACK WASTE PILE AREAS ON DICKSON LANE
POTENTIAL SOIL SAMPLING AREA, HIGH RAD READINGS
200-400 uR/HR ON BLACK PILES, STRESSED VEGETATION

1350 ~~14/145~~ (50) VIEW OF BLACK WASTE PILES IN WASH FILL AREA
16/165 LOOKING EAST

RUSTED DRUMS AROUND GW-13, SOME HAVE
750 uR/HR READINGS; DRUMS ARE EMPTY; 60-70 uR/HR
ON OTHER RUSTED DRUMS

1400 LEAVE AREA III FOR AREA II - REDUCTION BLDG ACROSS
DICKSON LANE

1405 ~~15/155~~ NORTH VIEW OF OUTSIDE OF REDUCTION BLDG SHOWING
17/175 (50) WESTERN CRATES/DRUMS

1406 ~~16/165~~ 18/185 (50) SE VIEW OF EMPTY H_2 BALL TANK
BEHIND REDUCTION BLDG.

(50) ~~16~~ 1407 ~~17/175~~ 19/195 (50) KNOWN RAD WASTE PILES BY NORTH WEST
CORNER OF REDUCTION BUILDING

1415 1.3 mR/HR FROM SOLID SLAG PILES, BLACK/GREY COLOR

1416 ~~18/185~~ (50) SOUTH VIEW OF RAD PILES; SAME AREA
20/205

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LI TUNGSTEN 3/22/90

02-9003-01

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1417 MUCH STRESSED VEGETATION IN AREA; BLACK & GREY GLASS ON SURFACE; PROPANE IN WHITE (30PSI) HORIZONTAL TANK.

REQUIRE USE OF FIREMAN BOOTS ON SITE - LATEX RIPS TOO EASILY ON SLAG MATERIAL & CONCRETE

1430 RAD WASTE PILE BEHIND DICKSON WAREHOUSE LOOKING EAST
~~20/19A/19S~~ 21/1/21S
56 mR/HR IN PILE, AREA IS ROPED OFF

1435 MOVE OUT OF DICKSON WAREHOUSE AREA; MONITORING WELL GM-15 NOT FOUND BETWEEN DICKSON WAREHOUSE AND OIL STORAGE TANK; 30 mR/HR ON CRATES

1440 RUSTED TANKS BEHIND LARGE TANK # FUEL OIL No. 2; TANKS ARE EMPTY

1445 22/1/22S ~~20/1/20S~~ NW VIEW OF ~~drums~~ / TANKS BEHIND DICKSON WAREHOUSE DRUMS 5/1/90

1450 23/1/23S ~~21/1/21S~~ EAST VIEW OF 2 UNLINED MUD HOLES ADJACENT TO OIL STORAGE TANK ON GARVIES PT ROAD

1455 24/1/24S ~~22/1/22S~~ SW VIEW OF SETTLING POND - LINED BUT LEAKING, ON GARVIES POINT ROAD

1510 LEAVE MUD POND AREA, RETURNING TO DECON AREA

1515 70 uR/H ALONG FENCE BY GREY TANK ON HEMP HILL ROAD
120-130 uR/H BY RED MARKER ON FENCE ALONG HEMP HILL ROAD; RED SPRAY PAINT MARKER

1520 RETURN TO DECON AREA, BEGIN TO BREAKDOWN DECON AREA / COMMAND POST

[illegible] [illegible]

LI TUNGSTEN 3/27/90
02-9003-01

1550 - FINISH BREAKING DOWN DECON AREA / COMMAND POST
CONSULTANT LOCKS GATE BEHIND US; GIVES ME
2 DRAWINGS OF SITE SHOWING TANK / TRANSFORMER LOCATIONS;
LIQUID WASTES DISPOSED OF ON SITE WITH
PERMISSION OF CONSULTANT; ALL SOLID DRY
WASTES BAGGED AND DISPOSED OF - OFF SITE

ALL PERSONNEL WERE FINALLY SCREENED
WITH THE PANCAKE RAD METER SUPPLIED BY
ELMER HURD FOR A FINAL RADIATION
CHECK - NO READINGS ABOVE BACKGROUND
ON THIS INSTRUMENT FROM ANY PERSONNEL.

ALL PERSONNEL DOSIMETERS SUPPLIED BY
ELMER HURD WERE CHECKED AND COLLECTED.
NO DOSIMETER SHOWED ANY READINGS ABOVE
BACKGROUND RADIATION AS DETERMINED FROM AN
OFF-SITE LOCALITY.

1415 DRIVE PAST LOCATION OF WELL GM-5
BY FENCE ALONG "THE PLACE". WELL IS
EASILY ACCESSIBLE THROUGH LOCKED GATE.

1425 LEAVE SITE. END OF DAY

[illegible] RLL [illegible] 4/30/90

LI TUNGSTEN 4/18/90
02-9003-01

SITE INSPECTION AND SAMPLING

NUS PERSONNEL ON SITE	RESPONSIBILITY
STEVEN OKULEWICZ	SITE MANAGER
GREG POLLACK GP	ASSISTANT SITE MANAGER
JESS TECSON	SITE SAFETY OFFICER
BOB CARSON BC	SITE SAFETY SUPPORT
JOHN HARRISON	SAMPLE MANAGEMENT OFFICER
BOB SCERBO RA	SAMPLER
JOE FILOSA JF	SAMPLER
PHIL CICOCCELLO PC	SAMPLER
MIKE GALLAGHER	SAMPLER
ELMER BURD	SITE SAFETY SUPPORT FROM NUS PITTSBURGH PA. OFFICE

ALL OF THE ABOVE PERSONNEL HAVE READ AND UNDERSTOOD THE WORK PLAN.

		BACKGROUND
11.7 range OVA #	469760	0 PPM
HNU #	469749	0 PPM
MINI-RAD #	428588	11 CPM
VICTOREEN RADIATION DETECTOR #		

0715 ARRIVED ON SITE - SIGNED IN WITH GUARD AT GATE
WEATHER: SUNNY, CLEAR, TEMP ≈ 40°F
LIGHT WIND FROM WEST 0-5 MPH
DOSIMETERS AND LUDLUM MICRO R PER HOUR RADIATION DETECTOR SUPPLIED BY ELMER BURD - NUS
PITTSBURGH OFFICE [illegible]

100505

HART

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RINSATES COLLECTED*	TIME	DATE
RIN-1 TROWEL	0815	4/18/90
RIN-2 BOWL	0835	4/18/90
RIN-3 BAILER	0845	4/18/90
RIN-4 DREDGE	0910	4/18/90

*ALL RINSATES WERE COLLECTED IN THE FIELD.

[illegible] 4/20/90

LI TUNGSTEN 4/18/90
02-9003-01

POCKET DOSIMETER #	PERSONNEL	TIME ON/OFF
110-46-8327	STEVEN OHLWEILER	0700/1940
138-48-3844	GREG POLLACK	0700/1940
137-66-8007	JESS TECSON	0700/1940
194-44-1428	BOB CARSON	0700/1940
138-52-8523	JOHN HARRISON	0700/1940
146-72-8328	TOM SCIABO	0700/1940
082-64-9762	JOE FILOSA	0700/1940
066-54-5759	PHIL CICCOLELLO	0700/1940
158-60-5788	MIKE GALLAGHER	0700/1940
169-24-9409	ELMER BURD	0700/1940

WELLS WILL BE OPENED ON LEVEL B AND ALL SAMPLERS WILL BE ON LEVEL C; DUSTY CONDITIONS REQUIRE ALL PERSONNEL TO WEAR LEVEL C

THIS LOGBOOK DESCRIBES FIELD SAMPLING FOR SURFACE WATER, SEDIMENT, AND SOIL SAMPLING. REFER TO LOGBOOK #0562 FOR GROUNDWATER SAMPLING, SIGNED OUT TO GREG POLLACK - ASM (ASSISTANT SITE MANAGER)

0730 BEGIN SETTING UP DECON PAD AT FRONT ENTRANCE OF PLANT

MEET WITH SUSAN MORRISSY OF FRED HART ASSOC

0900 FINISH DECONNING EQUIPMENT, PREPARING TO LEAVE FOR FIRST SAMPLE LOCATION IN 2 TEAMS: 1 TEAM NO. 1 - SOIL SAMPLING, SURFACE WATER SAMPLING, SEDIMENT SAMPLING; TEAM NO. 2 - GROUNDWATER SAMPLING SUPERVISED BY GREG POLLACK

[illegible]

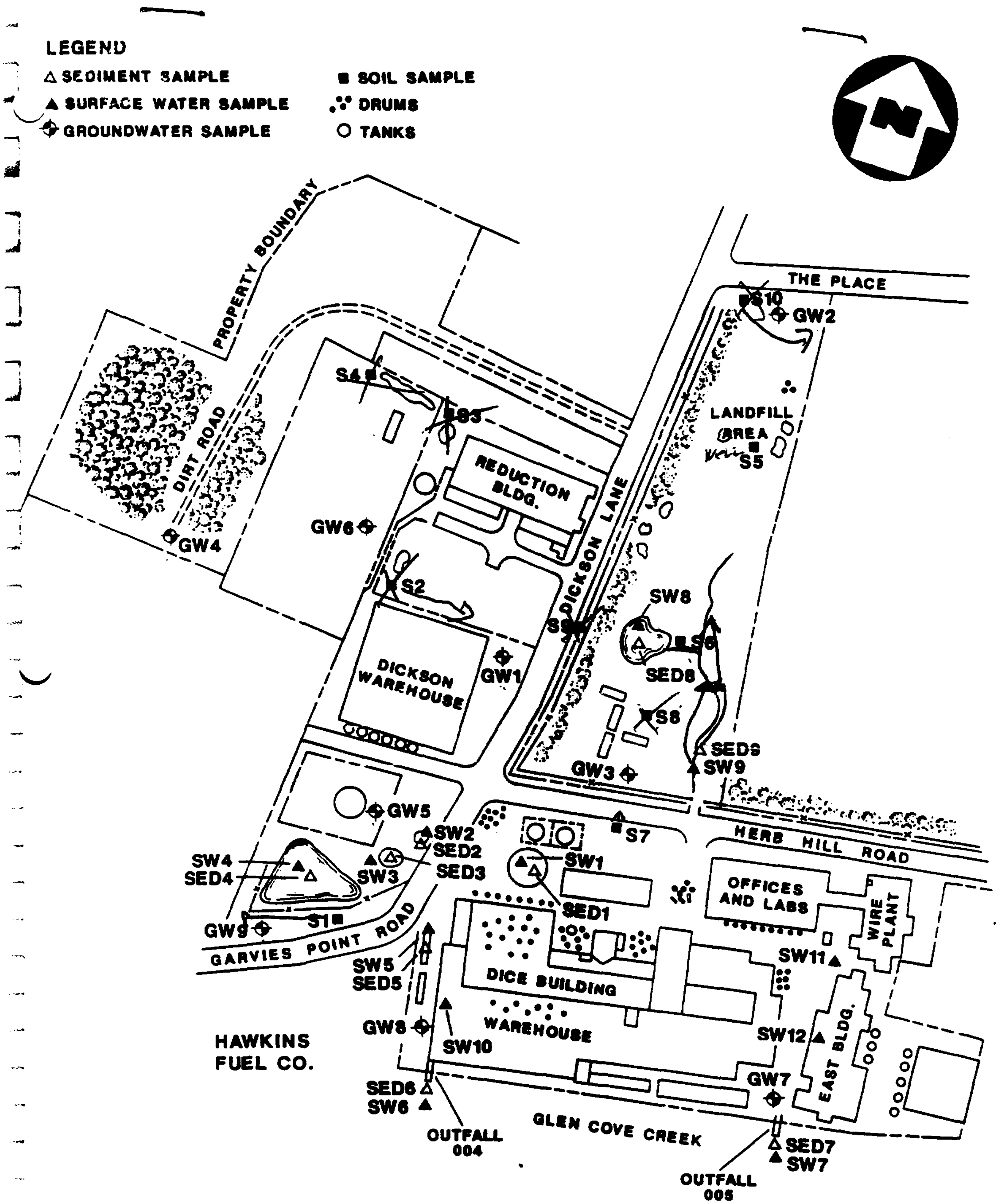


FIGURE 3

PRE-SAMPLE LOCATION MAP

LI TUNGSTEN, GLEN COVE, LONG ISLAND, N.Y.

NOT TO SCALE

NUS CORPORATION

100508

LI TUNGSTEN
02-9003-01 4/18/90

0930 JESS FECSON CONDUCTS TAILGATE SAFETY MEETING; TEAMS DEPART to TAKE SAMPLES*
0930 MOVE TO TAKE SOIL SAMPLE S2 BY NORTH EAST CORNER of DICKSON WAREHOUSE
0.2 MR/HR ON BROWN LOOSE SOIL IN AREA; ~~JOE F ON RESP~~
1010 JOE FILOSA TAKES SOIL SAMPLE S-2 MS/MSD SAMPLE
PRINT CAMERA NOT WORKING; 191; JOE FILOSA ON RESPIRATOR
NO READINGS ABOVE BACKGROUND ON OVA/HNU
1030 .02 MR/HR ON SAMPLE BOTTLES CONTAINING MIS SOIL SAMPLE
S-2 IS AT A BEARING of 280° FROM NE CORNER of DICKSON WAREHOUSE = 100 FEET; JOE FILOSA OFF RESPIRATOR
1045 MOVE TO TAKE SOIL SAMPLE S3 BY RAD PILE ON NW CORNER of REDUCTION BLDG
SOIL IS SATURATED WITH WATER; GREEN SOIL RUNOFF FROM RADPILE GOING DOWNHILL TOWARDS STREET; JOE FILOSA ON RESPIRATOR
0.5 to 0.9 MR/HR ON BROWN PILE
0.2 MR/HR ON SOIL IN BOWL; SAMPLE FROM 50 FEET NE of PROPANE TANK AT 10°
1105 JOE FILOSA TAKES SOIL SAMPLE S3
192/152; JOE FILOSA OFF RESPIRATOR (1107)

1110 MOVE TO TAKE SOIL SAMPLE S4 BEHIND PROPANE TANK - SUSPECTED LANDFILL AREA, CONTAINS MUCH SLAG THAT IS BROWN/BLACK IN LARGE CHUNKS; JOE FILOSA ON RESPIRATOR
NO READINGS ABOVE BACKGROUND ON OVA

* ALL SOIL SAMPLES WILL BE COLLECTED FROM A DEPTH of 0 TO 3 INCHES.

PRE-SAMPLE LOCATION MAP
LI TUNGSTEN, GLEN COVE, LONG ISLAND, N.Y.
NOT TO SCALE

4/30/90 4/30/90

100509

LI TUNGSTEN

02-9003-01 4/18/90

1125 JOE FILOSA TAKES SOIL SAMPLE COMPOSITE S4 BEHIND PROPANE TANK FROM BLACK, BROWN & RED SOIL; IP3/S3 - PHOTO OF COLORED SOIL COMPOSITE IN BOWL; 0.05 MR/HR ON BOWL CONTENTS; SAMPLES TAKEN FROM 3 FT^2 AREA OF COLORED SOIL AT 0-3 INCH DE

1130 JOE FILOSA COLLECTS SOIL SAMPLE S4 COMPOSITE 1P4/1S4 SAMPLE COLLECTED AT DISTANCE OF ≈ 50 FEET FROM PROPANE TANK AT A TREND OF N ~~266~~ 285° FROM NW CORNER OF PROPANE TANK; JOE FILOSA OFF RESPIRATOR RETURN TO DECON AREA TO DECON SAMPLES AND PICK UP OTHER SAMPLE BOTTLES

1215 - MOVE TO LARGE OIL STORAGE TANK TO TAKE SURFACE ~~SW~~ WATER AND SEDIMENT SAMPLES

1240 IP5/S5 MIKE GALLAGHER TAKES SURFACE WATER (MS/MSD) SAMPLE SW2 FROM MUD HOLE EAST OF OIL TANK WATER IS TURBID AND POND IS UNLINED SURROUNDED BY SAND; 6 DROPS OF HCL ADDED TO EACH VOA PH OF WATER IS 3.8; MIKE GALLAGHER ON RESPIRATOR

1305 MIKE GALLAGHER TAKES SEDIMENT SAMPLE SED-2 FROM MUD HOLE EAST OF OIL TANK; MIKE GALLAGHER OFF RESPIRATOR; 1P6/1S6

1335 MOVE TO TAKE SW-3 FROM OTHER MUD HOLE NORTH EAST OF MUD POND. THIS MUD HOLE IS ALSO UNLINED AND HAS A PH OF 3.8

1340-155 JOE FILOSA TAKES SW-3 FROM MUD HOLE JOE ON RESPIRATOR; 1P7/1S7

[illegible] 4/20/90 [illegible] 4/30/90

100510

1355 MOVE TO TAKE SED-3 IN 2nd MUD HOLE

1357 JOE FILOSA TAKES SED-3; 1P8/1S8; JOE
off RESPIRATOR

1400 – RETURN TO COMMAND POST TO DECON SAMPLES

1440 – MOVE TO TAKE SOIL-S1 BY GW9
SOIL IS BLACK AND PARTS ARE COVERED WITH SOD
MIKE G. ON RESPIRATOR

1450 – MIKE GALLAGHER TAKES SOIL SAMPLE S1
1P9/1S9 BY ROAD, SAMPLE WAS
COLLECTED ≈ 10 FEET FROM GW9 AT A BEARING
OF 240°; GARVIES POINT ROAD LOCATION

1459 MIKE GALLAGHER TAKES SOIL SAMPLE S11
1P10/1S10 (DUP of S1)

1500 MIKE GALLAGHER OFF RESPIRATOR

1505 MOVE TO TAKE SED4/SW4 BY MUD POND; JOE
FILOSA ON RESPIRATOR

1520 JOE FILOSA COLLECTS SW-4 FROM LINED MUD POND
1P11/1S11 pH IS 6.0

1530 JOE FILOSA COLLECTS SEDIMENT SAMPLE SED-4
FROM MUD POND 1P12/1S12

1544 JOE F. OFF RESPIRATOR

1545 MOVE TO TAKE SOIL S-9

1550 MIKE GALLAGHER ON RESPIRATOR

1558 MIKE GALLAGHER COLLECTS SOIL SAMPLE S9
1P13/1S13
NO RADIATION READINGS ABOVE BACKGROUND

1603 MIKE GALLAGHER OFF RESPIRATOR; SOIL S9 WAS
~~COLLECTED~~ COLLECTED AT A DISTANCE OF APPROX 2 FEET WEST OF
[illegible]

100512

LI TUNGSTEN
02-9003-01 4/18/90

1605 RETURN TO DECON AREA TO DROP OFF SAMPLES

1715 MOVE TO TAKE SURFACE WATER SW1 SAMPLE FROM CIRCULAR SHALLOW POOL

1730 JOE FILOSA TAKES SURFACE WATER SAMPLE SW1 1014/1514 ON RESPIRATOR
1735 JOE FILOSA TAKES SURFACE WATER SAMPLE SW13 (DUP OF SW-1) 1115/1515

1800 MOVE TO TAKE SEDIMENT SAMPLE SED-1 FROM POOL; NO SEDIMENT IN POOL, ONLY LEAVES IN PONAR DREDGE; JOE OFF RESPIRATOR
1804- RETURN TO COMMAND POST TO DECON SAMPLES

1830 MOVE TO TAKE SURFACE WATER SAMPLE SW6 AT OUTFALL 004, TIDE IS NOT QUITE HIGH
1840 MIKE GALLAGHER ON RESPIRATOR
1845 MIKE GALLAGHER COLLECTS SURFACE WATER SAMPLE SW6 1016/1516, PRINT CAMERA NOT WORKING AGAIN

1850 MIKE GALLAGHER COLLECTS SEDIMENT SAMPLE SED6 FROM OUTFALL 004 1017/1517 USING PONAR DREDGE 1 PPM ON HNU FOR BOWL OF SEDIMENT

1915 FINISH WITH SEDIMENT COLLECTION FOR SED6; MIKE OFF RESP., RETURNING TO COMMAND POST TO DECON SAMPLES AND PACK UP; LEAVE CUBE TRUCK, VAN & BREAK TRUCK ON SITE BEHIND LOCKED GATE - 24HR GUARD
1940 LEAVE SITE & RETURN TO HOTEL; ALL LIQUID WASTES WERE DRUMMED AND LEFT ON SITE, ALL DRY WASTES WERE BAGGED AND WILL BE DISPOSED OFF SITE;

LI TUNGSTEN 02-9003-01 4/19/90

POCKET DOSIMETER #	PERSONNEL	TIME ON/TIME OFF
110-46-8327	STEVEN OKULEWICZ	0725/1740
138-48-3844	GREG POLLACK	↓
137-66-8007	JESS TECSON	↓
194-44-1428	BOB CARSON	↓
138-52-8523	JOHN HARRISON	↓
146-72-8328	BOB SCORBO	↓
082-64-9762	JOE FILOSA	↓
066-54-5759	PHIL CICCOLELLO	↓
158-60-5788	MIKE GALLAGHER	↓
169-24-9409	ELMER BURD	↓

RINSATE COLLECTED*	TIME	DATE
RIN5 TROWEL	0825	4/19/90
RIN6 BOWL	0840	4/19/90
RIN7 BAILER	0855	4/19/90
RIN8 DREDGE	0915	4/19/90

*ALL RINSATES WERE COLLECTED IN THE FIELD

100513

3-01 4/19/90

ME ON/TIME OFF

725/1740

LI TUNGSTEN 4/19/90
02-9003-01

0710 ARRIVE ON SITE; NUS PERSONNEL AND RESPONSIBILITIES ARE THE SAME AS 4/18/90.

WEATHER: SUNNY, CLEAR, TEMP 47°F, LIGHT WIND OUT OF NW AT 5 MPH

MEET WITH FROM C. USAT REP - SUZANNE MORRISSEY

0725 BEGIN SETTING UP DECON PAD AND DECONNING EQUIPMENT

	BACKGROUND
OVA # B - NOT PUMPING	~~0 PPM~~ to 4/18/90
HNU # L 469748 - DEAD	0 PPM
MINI-RAD 428588	12 CPM
HNU # M 469749	0 PPM

0805 JESS TECSON & PHIL CICCOCCIO LEAVE FOR HARDWARE STORE TO BUY LOCKS, GARBAGE BAGS & PLASTIC SHEETS

0830 JESS & PHIL RETURN FROM HARDWARE STORE

0835 DECON OF EQUIPMENT CONTINUING

WE WILL LEAVE DRUMS OF DECON WATER AND PURGE WATER ON SITE

0920 JESS TECSON CONDUCTS TAILGATE SAFETY MEETING

0925 TEAM #2 - WELL CREW MOVES OUT TO TAKE GW-2
TEAM #1 - SOIL/SED/SW CREW MOVES OUT TO TAKE S10

100514

LI TUNGSTEN 4/19/90
02-9003-01

0950 BEGIN TO TAKE SOIL SAMPLE S10
NO READINGS ABOVE BACKGROUND ON OVA
8 PPM ON HNU, MOVE TO ANOTHER SPOT
NEXT AREA ALSO HAS READING OF 8 PPM - SCALLIONS?
PHIL C. ON RESPIRATOR

1005 PHIL CICOCELLO TAKES SOIL SAMPLE S10
2P1/251

1010 SOIL IS BROWN LOOSE AND SCALLIONS ARE GROWING
ADJACENT TO LOCATION, SAMPLE LOCATION IS AT
A BEARING OF 160° AT A DISTANCE OF 40 FEET FROM GW2
PHIL C. OFF RESPIRATOR

1040 CHECKING CALIBRATION ON HNU-H, CALIBRATION BY
A. CARSON; RECALIBRATED WITH TANK FOR ~~METHANE~~ 4/19/90
50 ~~10~~ 11.7 PROBE 4/19/90
PREVIOUS READINGS TAKEN ON SOIL S10 ARE
ERRONEOUS, RECHECKED WITH NEW CALIBRATION AND
READINGS ARE NOW BACK TO BACKGROUND; MOVE TO
BEGIN TO TAKE SOIL SAMPLE S5; PHIL C. ON RESPIRATOR

1100 0.03 MR/HR ON BLACK WASTE PILES NEARBY

1110 0.15 MR/HR ON SOIL IN BOWL FOR S5 FROM
~~1111~~ LANDFILL AREA
4/19/90 1112 PHIL CICOCELLO TAKES SOIL SAMPLE S5 2P2/252
SAMPLE TAKEN AT A TREND OF 24° FROM
GM-13 BY RAD PILES, AND AT A
DISTANCE OF 530 FEET; PHIL C. OFF RESPIRATOR

1130 RETURN TO DECON AREA AND GET NEXT
SAMPLE BOTTLES

100515

LI TUNGSTEN 4/19/90
02-9003-01

1200 MOVE TO TAKE SURFACE WATER SAMPLE SW 8 FROM POND; POND IS APPROXIMATELY 50 FEET IN DIAMETER AND ABOUT 1 FOOT DEEP IN MIDDLE, PART OF POND IS STAGNANT AND SOME WATER DRAINS OUT TO A STREAM, EAST OF POND IN LANDFILL
NO READINGS ABOVE BACKGROUND ON HNU OR RADIATION METER FROM WATER OR SEDIMENT
JOE FILOSA ON RESPIRATOR

1220 JOE FILOSA COLLECTS SW 8 FROM POND IN LANDFILL 2B3/253, pH of H_2O ≈ 3.8

1230 JOE FILOSA COLLECTS SED 8 FROM POND
NO READINGS ABOVE BACKGROUND ON HNU FOR SEDIMENT SAMPLE; JOE FILOSA OFF RESPIRATOR
2B4/254

1245 RETURN TO DECON AREA FOR OTHER SAMPLE BOTTLES AND DECON SAMPLES

1340 MOVE TO TAKE SOIL SAMPLE S-8 BY TANKS IN LANDFILL AREA; JOE FILOSA ON RESPIRATOR

1355 RECALIBRATE HNU L # 169748 TO 11.7 PROBE

1405 2 PPM READING ON OVA FROM SOIL BY TANKS IN LANDFILL AREA

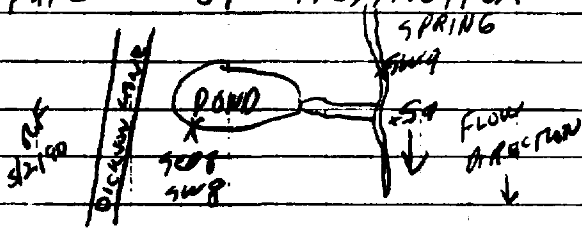
1410 JOE FILOSA TAKES SOIL SAMPLE S-8
2B5/255; S-8 COLLECTED AT A DISTANCE OF 45 FEET FROM WELL GM-7 AT A BEARING OF 275° IN LANDFILL AREA BY TANKS

Li TUNGSTEN 4/19/90
02-9003-01

1415 4 PPM ON HNU, NO READINGS ABOVE BACKGROUND ON RADIATION METER FROM SOIL

1425 RETURN TO COMMAND POST FOR MORE BOTTLES; JOE FILOSA OFF RESPIRATOR

1430 MOVE TO TAKE SURFACE WATER SW9 BY CREEK which FLOWS PAST POND, CREEK FLOWS INTO PARKING LOT PHIL C ON RESPIRATOR



1435 PHIL CICCOLELLO TAKES SURFACE WATER SAMPLES SW9 2P6/256 END OF 1ST ROLL FOR EMT CAMERA

1450 PHIL CICCOLELLO TAKES SEDIMENT SAMPLE SED-9 257/2P7 FROM ~~CREEK~~ SPRING 4/19/90 AROUND POND; SEDIMENT IS DEEP RED BROWN WITH RUST STAINS ALONG BANK, NO READINGS ABOVE BACKGROUND ON HNU/RADMETER ON SAMPLES; PHIL OFF RESPIRATOR

1500 MOVE TO TAKE SOIL SAMPLE S-6 ACROSS (PHIL OFF RESP. FROM OPENING OF ~~CREEK~~ SPRING 4/19/90 JOE FILOSA ON RESPIRATOR S-6 IS APPROX 20 FEET EAST OF POND DRAINAGE AT BEARING OF 90°

1510 JOE FILOSA TAKES S-6 FROM EAST BANK OF SPRING ~~258/2P8~~ 4/19/90 258/2P8

1515 JOE FILOSA OFF RESPIRATOR; NO READING ABOVE BACKGROUND HNU

1520 RETURN TO DECON AREA

1530 MOVE TO TAKE FINAL SOIL SAMPLE S9 ALONG FENCE BY RED PAINT MARKER ON FENCE

100517

LI TUNGSTEN 4/19/90
02-9003-01

1540 PHIL C. ON RESPIRATOR; SOIL SAMPLE S7 WAS TAKEN AT A DISTANCE OF 2 FEET FROM FENCE AT RED MARKER, 180° HEADIN[G]

1545 PHIL C. TAKING SOIL SAMPLE S-7 ~~2S3/2P3~~ (50) 4/19/90 2S9/2P9

1550 RETURN TO DECON AREA, PHIL C. OFF RESPIRATOR

1630 MOVE TO TAKE SW 7 BY END OF EAST BLDG BELOW ~~ABOVE~~ OUTFALL 005, ~~SAMPLES~~ (50) 4/19/90 (50) 4/19/90 ALL PERSONNEL ARE ON LEVEL C DUE TO DUSTY CONDITIONS

1635 JOE PICOSA TAKES SURFACE WATER SAMPLE SW7 ~~2S4/2P4~~ (50) 4/19/90 2S10/2P10 FROM WATER BELOW OUTFALL 005 IN GLEN COVE CREEK

1645 BEGIN TO TAKE SEDIMENT SAMPLE SED 7 FROM OUTFALL 005, TIDE IS RISING, SAMPLE TAKEN BELOW OUTFALL IN GLEN COVE CREEK USING PONAR DREDGE

1650 JOE PICOSA TAKES SEDIMENT SAMPLE SED 7 - 2S11/2[P11] (50) 4/19/90 ~~2S5/2P5~~; NO READINGS ABOVE BACKGROUND ON OVA OR ON RADIATION METER

1700 RETURN TO DECON AREA TO DROP SAMPLES OFF AND PICK UP BOTTLES FOR MORE SURFACE WATER

1715 MOVE TO TAKE SW-12 FROM FLOOR OF EAST BUILDING

1730 OVA FROM WELL CREW IS DEAD, NO MORE WORKABLE AIR INSTRUMENTS - RETURN TO DECON AREA TOTAL CREW IS OFF RESPIRATORS

100518

LI TUNGSTEN 4/19/90
02-9003-01

1735- SAMPLES SW12, SW11, SED5, AND SW5 COULD NOT BE COLLECTED DUE TO LACK OF FUNCTIONAL HEALTH & SAFETY AIR MONITORING EQUIPMENT.

1740 BEGIN TO BREAK DOWN DECON AREA AND PACK UP WASTE OF SAMPLES; DRY WASTES BAGGED, ALL LIQUIDS DRUMMED & LEFT ON SITE FOR CHARACTERIZATION

1840 LEAVE SITE; SAS SAMPLES FOR METALS AND RADIOLOGICAL ANALYSIS WILL BE SEALED AND STORED AT EPA, EDISON N.J. OFFICE IN ARCHIVE ROOM UNTIL A LABORATORY IS CONTRACTED TO DO THE ANALYSES.

1845 JOHN HARRISON AND BOB SCERBO LEAVE SITE WITH RAS SAMPLES FOR FEDERAL EXPRESS OFFICE IN

1900 ARRIVE AT FEDERAL EXPRESS OFFICE IN MINEOLA LONG ISLAND TO SHIP SAMPLES

22

Li TUNGSTEN 4/20/90
02-9003-01

1000 - SAS SAMPLES FOR METALS AND RADIOLOGICAL ANALYSIS ARE DEPOSITED IN ARCHIVE ROOM AT EPA HEADQUARTERS IN EDISON, N.J.

100520

LI TUNGSTEN 02-9003-01 4/23/90

SAMPLE SUMMARY
CASE# 13906

ORGANICS LABORATORY:

COMPUCHEM LABORATORIES
3308 CHAPEL HILL/NELSON HWY.
RTP, NC 27709
ATTN: NATALIE CARTER
AIRBILL # 6097383390

INORGANICS LABORATORY:

ENSECO/ROCKY MOUNTAIN ANALY.
4955 YARROW STREET
ARVADA, CO 80002
ATTN: BECKY WILLIAMS
AIRBILL # 6097383294

NUS ID #	ORGANIC #	INORGANIC #	TYPE
NYJL-GW1	BEB-18	MBCJ-01	GW
NYJL-GW2	BEB-19	MBCJ-02	GW
NYJL-GW3	BEB-20	MBCJ-03	GW
NYJL-GW4	BEB-21	MBCJ-04	GW
NYJL-GW5	BEB-22	MBCJ-05	GW
NYJL-GW7	BEB-24	MBCJ-07	GW
NYJL-GW8	BEB-25	MBCJ-08	GW
NYJL-GW9	BEB-26	MBCJ-09	GW
DO NYJL-GW10	BEB-27	MBCJ-10	GW DUP.F
NYJL-SW01	BEB-28	MBCJ-11	SW
A NYJL-SW02	BEB-29	MBCJ-12	SW MS/M

100521

LI TUNGSTEN 02-9003-01 4/23/90

SAMPLE SUMMARY CONTINUED
CASE # 13906

NUS ID#	ORGANIC #	INORGANIC #	TYPE
NYJL SW03	BEB-30	MBCJ-13	SW
NYJL-SW04	BEB-31	MBCJ-14	SW
NYJL-SW06	BEB-33	MBCJ-16	SW
NYJL-SW07	BEB-34	MBCJ-17	SW
NYJLSW08	BEB-35	MBCJ-18	SW
NYJLSW09	BEB-36	MBCJ-19	SW
NYJL-SW10 [illegible]	BEB-37	MBCJ-20	SW
NYJL-SW13 [illegible]	BEB-40	MBCJ-23	SW dup.
NYJL-SED2	BEB-42	MBCJ-25	SED
NYJL-SED3	BEB-43	MBCJ-26	SED
NYJL-SED4	BEB-44	MBCJ-27	SED
NYJL-SED6	BEB-46	MBCJ-29	SED
NYJL-SED7	BEB-47	MBCJ-30	SED
NYJL-SED8	BEB-48	MBCJ-31	SED
NYJL-SED9	BEB-49	MBCJ-32	SED
NYJL-S1	BEB-50	MBCJ-33	SOIL
NYJL-S2	BEB-51	MBCJ-34	SOIL MS/
NYJL-S3	BEB-52	MBCJ-35	SOIL
NYJL-S4	BEB-53	MBCJ-36	SOIL
NYJL-S5	BEB-54	MBCJ-37	SOIL
NYJL-S6	BEB-55	MBCJ-38	SOIL
NYJL-S7	BEB-56	MBCJ-39	SOIL
NYJL-S8	BEB-57	MBCJ-40	SOIL
NYJL-S9	BEB-58	MBCJ-41	SOIL
NYJL-S10	BEB-59	MBCJ-42	SOIL
NYJL-S11	BEB-60	MBCJ-43	SOIL DU
NYJL-RIN1	BEB-61	MBCJ-44	RINSATE-TR
NYJL-RIN2	BEB-62	MBCJ-45	RINSATE-BOU

LI TUNGSTEN 02-9003-01 4/23/90 25

SAMPLE SUMMARY CONTINUED
CASE # 13906

NUS ID #	ORGANIC #	INORGANIC #	TYPE
NYJL-RIN 3	BEB-63	MBCJ-46	RINSATE-[illegible]
NYJL-RIN 4	BEB-64	MBCJ-47	RINSATE-DREDGE
NYJL-RIN 5	BEB-65	MBCJ-48	RINSATE-TROWEL
NYJL-RIN 6	BEB-66	MBCJ-49	RINSATE-BOWL
NYJL-RIN 7	BEB-67	MBCJ-50	RINSATE-BAILER
NYJL-RIN 8	BEB 68	MBCJ-51	RINSATE-DREDGE
NYJL-TRBK1	BEB 69	———	TRIP BLANK
NYJL-TRBK2	BEB 70	———	TRIP BLANK

GW = GROUNDWATER
SW = SURFACE WATER
SED = SEDIMENT

WELL No.	GROUNDWATER SAMPLE No.
GM-4	GW1
GM-5	GW2
GM-3D	GW3
GM-10 ~~(NOT COLLECTED)~~ SO 4/26/90	GW4
GM-14A	GW5
GM-16 (NOT COLLECTED)	GW6
GM-17	GW7
EMW-3	GW8
~~6~~ EMW-4 SO 4/26/90	GW9
EMW-4	GW10

100523

LI TUNGSTEN

~~02-9001-20~~ 02-9003-01
SD 5/9/90

PHOTO LOG - ONSITE RECON 3/22/90

ALL PHOTOS TAKEN BY STEVEN OKULEWICZ

ROLL#	PICTURE/SLIDE#	TIME	DATE	DESCRIPTION
1	1P/1S	0950	3/22/90	SOUTHWEST VIEW of STAGED DRUMS CONTAINING PCB OIL FROM ELECTRICAL TRANSFORMERS ONSITE
1	2P/2S	0955	3/22/90	WEST VIEW of RUSTED AND LEAKING DRUMS of PROCESSED WASTE ORE OUTSIDE of DICE BUILDING
1	3P/3S	1000	3/22/90	WEST VIEW of CORRODED DRUMS ALONG FRONT of DICE BUILDING
1	4P/4S	1005	3/22/90	OPEN, RUSTED DRUMS of PROCESSED ORE LOOKING NORTH BEHIND CARBIDE BUILDING
1	5P/5S	1015	3/22/90	NORTH VIEW of TANK AND WATER TREATMENT POOL

LI TUNGSTEN

02-9003-01

ROLL #	PICTURE/SLIDE #	TIME	DATE	DESCRIPTION
1	6P/6S	1022	3/22/90	SOUTHWEST VIEW of RADIOACTIVE RUSTED DRUMS of PROCESSED ORE
1	7P/7S	1025	3/22/90	SOUTH VIEW of OIL RECOVERY SUMPS ALONG WESTERN PART of DICE BLDG.
1	8P/8S	1100	3/22/90	30-GALLON DRUMS of ORE AND LEAKING WOODEN TANK No. 32 ON CORNER of HERB HI[illegible] ROAD AND DICKSON LA[illegible]
1	9P/9S	1105	3/22/90	WEST VIEW of CORNER of HERB HILL ROAD & DICKSON LANE WHERE RADIOACTIVE ORE WAS REMOVED.
1	10P/10S	1135	3/22/90	NORTH VIEW of MINE PLANT AND LABORATORY
1	11P/11S	1150	3/22/90	LARGE, EMPTY PROCESS TANKS OUTSIDE LOUNG[illegible] BUILDING LOOKING EAST

100525

LI TUNGSTEN 02-9003-01

ROLL #	PICTURE/SLIDE #	TIME	DATE	DESCRIPTION
1	12P/12S	1200	3/22/90	VIEW OF FRIABLE ASBESTOS PIPE WRAPPING OUTSIDE OF LOUNG BUILDING
1	13P/13S	1205	3/22/90	VIEW OF MONITORING WELL GMW-17 LOCATED ON SOUTHWEST CORNER OF EAST BLDG
1	14P/14S	1206	3/22/90	NORTH VIEW OF WHITE, HORIZONTAL AMMONIA TANK AND EMPTY VERTICAL STORAGE TANKS
1	15P/15S	1220	3/22/90	WEST VIEW INSIDE OF DICE ~~BUILDING~~ WAREHOUSE SHOWING STACKED CORRODED DRUMS OF RAW AND PROCESSED ORE
1	16P/16S	1350	3/22/90	EAST VIEW OF BLACK WASTE PILES IN LANDFILL AREA
1	17P/17S	1405	3/22/90	NORTHWEST VIEW OF DRUMS OUTSIDE OF REDUCTION BLDG.

100527

LI TUNGSTEN 02-9003-01

ROLL #	PICTURE/SLIDE #	TIME	DATE	DESCRIPTION
1	18P/18S	1406	3/22/90	SOUTHEAST VIEW OF EMPTY HYDROGEN BALL TANK BEHIND REDUCTION BLDG.
1	19P/19S	1407	3/22/90	ROPED-OFF RADIOACTIVE WASTE PILE BY NORTHWEST CORNER OF REDUCTION ~~PILE~~ BUILDING
1	20P/20S	1416	3/22/90	SOUTH VIEW OF RADIOACTIVE WASTE PILE BY REDUCTION BUILDING
1	21P/21S	1430	3/22/90	RADIOACTIVE WASTE PILE BEHIND DICKSON WAREHOUSE LOOKING EAST
1	22P/22S	1445	3/22/90	NORTH VIEW OF DRUMS, CRATES, AND TANKS BEHIND DICKSON WAREHOUSE.
1	23P/23S	1450	3/22/90	EAST VIEW OF 2 UNLINED MUD HOLES ADJACENT TO OIL STORAGE TANK ON GARVIES POINT ROA
1	24P/24S	1455	3/22/90	SOUTHWEST VIEW OF LINED SETTLING POND ON GARVIES POINT ROAD

LI TUNGSTEN 02-900301

PHOTO LOG - ONSITE RECON 4/18/90 - 4/19

PHOTOS TAKEN BY STEVEN OKULEWICZ AND GREG POLLACK*

ROLL #	PICTURE/SLIDE #	TIME	DATE	DESCRIPTION
~~1~~ 1	P1/S1	1010	4/18/90	JOE FILOSA TAKES SOIL SAMPLE S2 BY DICKSON WAREHOUSE
1	P2/S2	1105	4/18/90	JOE FILOSA TAKES SOIL SAMPLE S3 BY NORTHWEST CORNER OF REDUCTION BUILDING
1	P3/S3	1125	4/18/90	COLORED SOIL COMPOSITE FROM BEHIND PROPANE TANK
1	P4/S4	1130	4/18/90	JOE FILOSA COLLECTS SOIL COMPOSITE SAMPLE S4 FROM BEHIND PROPANE TANK
1*	P1/S1*	1140	4/18/90	ROBERT SCOTTO COLLECTS GROUNDWATER SAMPLE GW1
1	P5/S5	1240	4/18/90	MIKE GALLAGHER COLLECTS SURFACE WATER SAMPLE SW2 FROM MUD HOLE EAST OF OIL TANK

LI TUNGSTEN 02-9003-01

ROLL #	PICTURE/SLIDE #	TIME	DATE	DESCRIPTION
1	P6/S6	1305	4/18/90	MIKE GALLAGHER COLLECTS SEDIMENT SAMPLE SED2 FROM MUD HOLE EAST of OIL TANK
1	P7/S7	1340	4/18/90	JOE FILOSA COLLECTS SURFACE WATER SAMPLE SW3 FROM MUDHOLE NORTHEAST of MUD POND
1	P8/S8	1357	4/18/90	JOE FILOSA COLLECTS SEDIMENT SAMPLE SED3 FROM MUDHOLE NORTHEAST of MUD POND
1*	P2/S2*	1445	4/18/90	ROBERT SZABO COLLECTS GROUNDWATER SAMPLE GW5
1	P9/S9	1450	4/18/90	MIKE GALLAGHER TAKES SOIL SAMPLE S1 ALONG GARVIES POINT ROAD
1	P10/S10	1459	4/18/90	MIKE GALLAGHER COLLECTS SOIL SAMPLE S11 FROM ALONG GARVIES POINT ROAD
1	P11/S11	1520	4/18/90	JOE FILOSA COLLECTS SURFACE WATER SAMPLE SW4 FROM LINED MUD POND

100530

LI TUNGSTEN 02-9003-01

ROLL #	PICTURE/SLIDE #	TIME	DATE	DESCRIPTION
1	P12/S12	1530	4/18/90	JOE FILOSA COLLECTS SEDIMENT SAMPLE SED4 FROM MUD POND
1*	P3/S3*	1545	4/18/90	ROBERT SCERBO COLLECTS GROUNDWATER SAMPLE GW9
1	P13/S13	1558	4/18/90	MIKE GALLAGHER COLLECTS SOIL SAMPLE S9 BY GATE ALONG DICKSON LANE
1	P14/S14	1730	4/18/90	JOE FILOSA TAKES SURFACE WATER SAMPLE SW1 FROM WATER TREATMENT POOL
1	P15/S15	1735	4/18/90	JOE FILOSA TAKES SURFACE WATER SAMPLE SW13 FROM WATER TREATMENT POOL
1*	P4/S4*	1830	4/18/90	ROBERT SCERBO COLLECTS GROUNDWATER SAMPLE GW4
1	P16/S16	1845	4/18/90	MIKE GALLAGHER COLLECTS SURFACE WATER SAMPLE SW6 FROM BELOW OUTFALL No. 004 ON GLEN COVE CREEK
1	P17/S17	1850	4/18/90	MIKE GALLAGHER COLLECTS SEDIMENT SAMPLE SED6 [illegible]

LI TUNGSTEN 02-9003-01

ROLL #	PICTURE/SLIDE #	TIME	DATE	DESCRIPTION
2	P1/S1	1005	4/19/90	PHIL CICCOLELLO TAKES SOIL SAMPLE S10
1# (SD 5/2/90)	P5/S5	1030	4/19/90	ROBERT SCELFO COLLECTS GROUNDWATER SAMPLE GW2
2	P2/S2	1112	4/19/90	PHIL CICCOLELLO TAKES SOIL SAMPLE S5 FROM LANDFILL AREA
2	P3/S3	1220	4/19/90	JOE FILOSA COLLECTS SURFACE WATER SAMPLE SW8 FROM POND IN LANDFILL AREA
2	P4/S4 (SD 5/2/90)	1230	4/19/90	JOE FILOSA COLLECTS SEDIMENT SAMPLE SED8 FROM POND IN LANDFILL AREA
1#	P6/S6#	1235	4/19/90	ROBERT SCELFO COLLECTS GROUNDWATER SAMPLE GW3
2	P5/S5	1410	4/19/90	JOE FILOSA TAKES SOIL SAMPLE S8 BY TANKS IN LANDFILL AREA
2	P6/S6	1435	4/19/90	PHIL CICCOLELLO TAKES SEDIMENT SAMPLE SED9 FROM SPRING ABOVE POND

LI TUNGSTEN 02-9003-01

ROLL #	PICTURE/SLIDE #	TIME	DATE	DESCRIPTION
2	P7/S7	1450	4/19/90	PHIL CICCOLELLO TAKES SEDIMENT SAMPLE SED9 FROM SPRING ABOVE POND
1*	P7/S7*	1510	4/19/90	ROBERT SCERBO COLLECTS GROUNDWATER SAMPLE GW8
2	P8/S8	1510	4/19/90	JOE FILOSA TAKES SOIL SAMPLE S6 FROM EAST BANK OF SPRING
1*	P8/S8	1530	4/19/90	MIKE GALLAGHER COLLECTS SURFACE WATER SAMPLE SW10 FROM FLOODED FLOOR OF DICE BUILDING.
2	P9/S9	1545	4/19/90	PHIL CICCOLELLO TAKES SOIL SAMPLE S7 ALONG FENCE ON HERB HILL ROAD
2	P10/S10	1635	4/19/90	JOE FILOSA TAKES SURFACE WATER SAMPLE SW7
2	P11/S11	1650	4/19/90	JOE FILOSA TAKES SEDIMENT SAMPLE SED7
1*	P9/S9*	1715	4/19/90	ROBERT SCERBO COLLECTS GROUNDWATER SAMPLE GW7

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02-9003-01

NUS CORPORATION

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0562

LI TUNGSTEN #3
02-9003-01
TDD MANAGER-S. OKULEWICZ
LOGBOOK #0579
MAY 2, 1990

Li TUNGSTEN 02-9003-01

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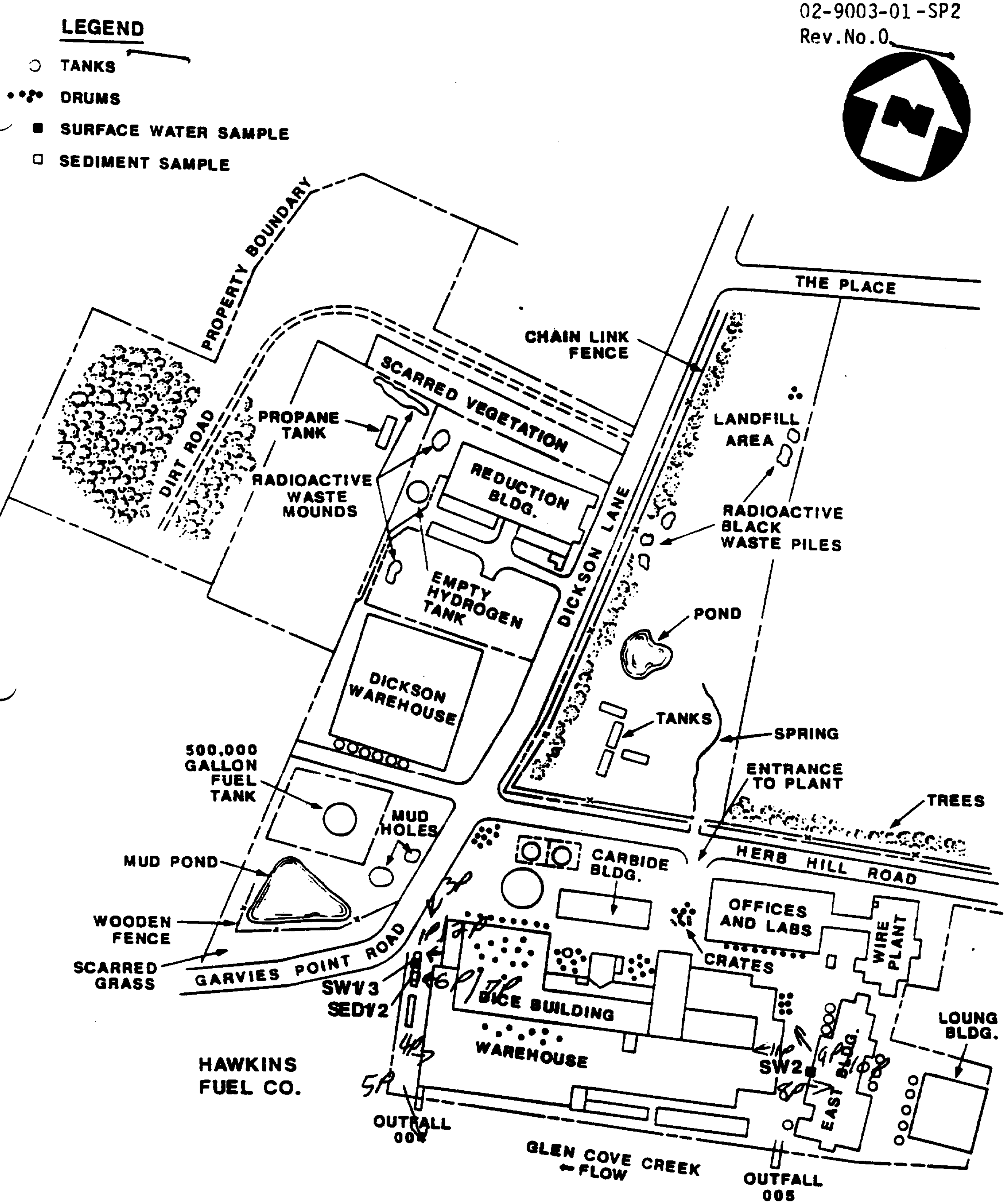


FIGURE 2

PRE-SAMPLE LOCATION MAP

LI TUNGSTEN, GLEN COVE, LONG ISLAND, N.Y.

NOT TO SCALE

NUS CORPORATION

100536

Li TUNGSTEN 02-9003-01 5/15/90

PERSONNEL ON SITE — RESPONSIBILITIES

STEVEN OKULEWICZ	SO	SITE MANAGER
RICHARD FEINBERG	RSF	SITE SAFETY OFFICER
JOE FILOSA	JF	SAMPLER
ROBERT SCERBO	RAS	SAMPLE MANAGEMENT
PHIL CICCOLELLO	PC	SAMPLER

ALL OF THE ABOVE PERSONNEL HAVE READ AND UNDERSTOOD THE WORK PLAN

	BACKGROUND
OVA # J-469759	0 PPM
HNU # L-469748	0 PPM
MINI RAD # 428588	9 CPM
VICTOREEN RAD METER # 197174	0.03 mR/HR
CAMERAS 307127/469774	

WEATHER CONDITIONS - SUNNY, 70°F, LIGHT WIND OUT OF NORTHWEST AT 5 MPH

0820 ARRIVE ON SITE, MEET WITH MR. ROOK FROM HART ENVIRONMENTAL

0830 BEGIN SETTING UP DECON AREA BY FRONT GATE OF Li TUNGSTEN

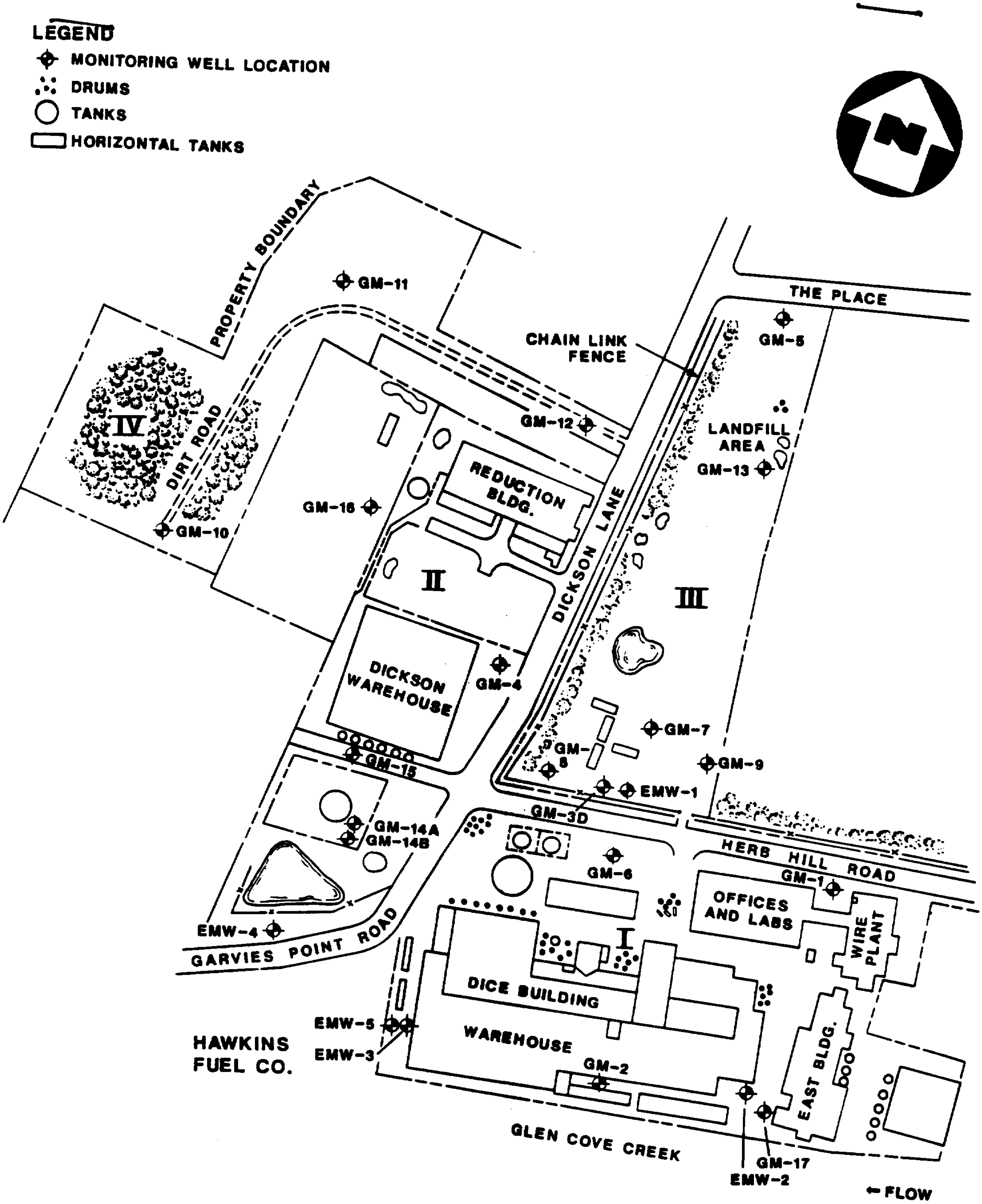
0840 TAILGATE SAFETY MEETING CONDUCTED BY RICHARD FEINBERG

[illegible signature] [illegible signature]

LI TUNGSTEN #2
02-9003-01
TDD MANAGER-S. OKULEWICZ
LOGBOOK #0562
APRIL 9, 1990

LI TUNGSTEN 07-9003-01

THIS IS LOGBOOK 2 OF 3 LOGBOOKS
FOR LI TUNGSTEN



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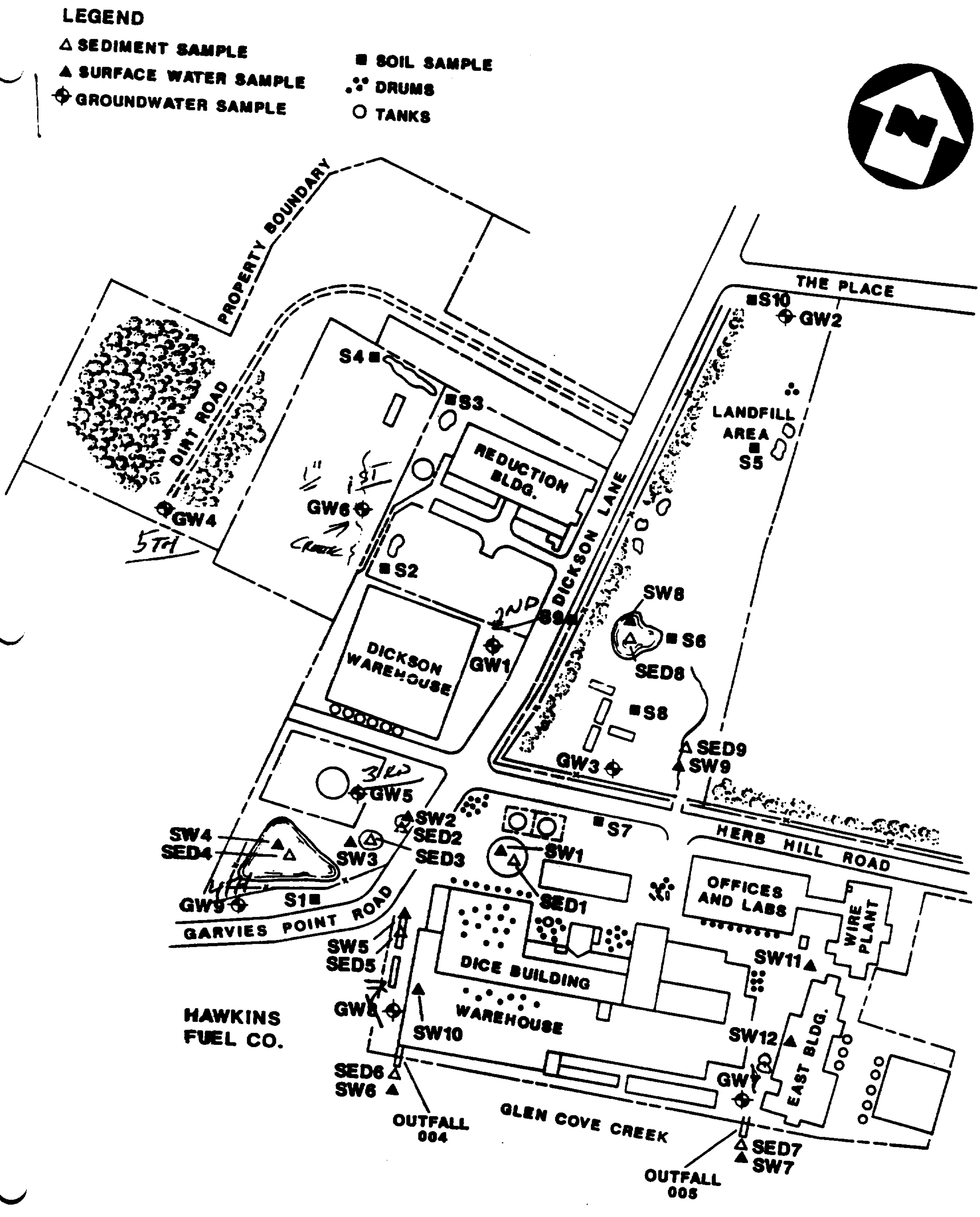
MONITORING WELL LOCATION MAP

FIGURE 3

LI TUNGSTEN, GLEN COVE, LONG ISLAND, N.Y.

NOT TO SCALE

NUS CORPORATION



PRE-SAMPLE LOCATION MAP

LI TUNGSTEN, GLEN COVE, LONG ISLAND, N.Y.

NOT TO SCALE

FIGURE 3

NUS CORPORATION

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02-9003-01 NYSL $I

GT Tungsten

LOGBOOK CUSTODY ASSIGNED TO GREG POLLACK @ 4/18/90

[signature]

THIS LOGBOOK WILL BE UTILIZED ON 4/18/90 TO DOCUMENT THE FIELD ACTIVITIES OF THE MONITORING WELL SAMPLING TEAM

CAMERAS

CANNON CP-6 EPA#	469775
CANON AE-1	307176
2WAY RADIO (MT7000)	683522
MINI RAD	469786
OVA (L)	469783
HNU (C)	307140
(PROBE)	11.7

WIND WNW 10 MPH, SUNNY, CLEAR, TEMP ~ 40°F

A 3 HP BRIGGS & STRATTON TRASH PUMP WILL BE UTILIZED IN STEAD OF THE HONDA PUMP

0900 CREW WILL BE

G. POLLACK	ASM	
B. CARSON	ASSO	
P. CICOLELLO ~~M. CHILLANDER~~ GP	SAMPLER	SCBA# 307186
J. TEESON	SSO	SCBA# 307168
B. SCERBO	SAMPLER	SCBA# 428552

~~S~~ SUSAN MORRISSEY - FRED C. HART (CONS) GP

100542

Ref: WQAP-SI
Rev. No. 1

EPA REGION 2 SPECIFIC QC REQUIREMENTS

LI TUNGSTEN WELLS

DEPTH, DTW, VOL

SW-1 (GM-4) 16' - 1.3' = 14.7'; 1 VOL = 1.4 GAL, PURGE > 4 GALS

SW2 (GM-5) 27' - 15.6' = 11.4'; 1 VOL = 1 GAL, PURGE > 3 GALS

SW3 (GM-3D) 26' - 5.0 = 21'; 1 VOL = 2 GAL, PURGE > 6 GALS

SW4 (GM-10) 54' - 45.8' = 8.2'; 1 VOL = 1.3 GAL, PURGE > 4 GALS

SW5 (GM-14A) 18' - 6.0' = 12'; 1 VOL = 2 GAL, PURGE > 6 GALS

SW6 (GM-16) 9' - 9.6' = -0.6'; 1 VOL = 1 GAL, PURGE > 3 GALS

SW7 (GM-17) 17' - 11' = 6'; 1 VOL = 1 GAL, PURGE > 3 GALS

SW8 (EMW-3) 9.5' - 3.0' = 6.5'; 1 VOL = 1 GAL, PURGE > 3 GALS

SW9 (EMW-4) 21' - 5.0' = 16'; 1 VOL = 3 GALS PURGE > 8 GALS

40 GALS MIN TOTAL

[signature] 4/10/90

[signature] 4/10/90

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02-9003-01 LI TUNGSTEN NYSL $I

CHECKING/CALIB. PH PEN #629783
SOLUTIONS PH 7 396809 9/12/90
PH 4 379808 8/22/90
PH 10 405809 9/16/90

B. SCERBO PERFORMING CALIBRATION ON PEN.
UNABLE TO ADJUST CALIB. ON PEN
THE TRIM/BALANCE SCREW HEAD IS STRIPPED
AND FROZEN. WILL UTILIZE PH PAPER
LOAD SLIDE AND PRINT FILM IN CAMERAS

0940 DEPART FROM COMMAND POST FOR GW 6 LOCATION

0955 NO AIR READINGS ABOVE BACKGROUND. RAD ON
N-2C98 12 µR/HR CREW RETURNING TO
COMMAND AREA FROM GW 6 LOCATION

1005 RETURN TO GW 6 LOCATION WITH REST OF
SAMPLING EQUIP. WELL IS LOCATED IN SMALL CREEK.

10:15 SAMPLERS ON AIR R. SCERBO P. CIROLELLO
INITIAL 4 ppm OVA THEN ZERO NO READING ABOVE
BACKGROUND ON HNU. WELL SCREEN SLOTT
AT SURFACE 7" STICK UP RAN CONDUCTIVITY
PROBE IN. WELL IS SILTED UP TO SURFACE
INFORMED S. CHULEWITZ. ABANDON SAMPLING
SAMPLERS DISTURBED WELL 110 HNU 40 OVA (p

1025 SAMPLERS OFF AIR BREAK DOWN AREA & BEGIN
TO RETURN TO COMMAND AREA.

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[signature] 11/20/90 [signature]

C2-9003-01 LI TUNGSTEN NYSL&I

1030 COMPLETE EQUIP REMOVAL FROM GW 6
BAGGED ALL PLASTIC WASTE
R. CARSON & M. GALLIGHER RETURN TO MAIN COMMAND
POST TO PICK UP GW 1 SAMPLE BOTTLES AND
REPAIR TORN PPE (R. CARSON)

1045 R CARSON / M. GALLIGHER RETURN. M. GALLIGHER
GOING WITH SOIL SAMPLING CREW

1048 R SCERBO & P. CICOLELLO ON AIR. REMOVED
WELL COVER, NO WELL CAP DEPTH TO GW
7" WELL ~~DEPTH~~ 14'9" NO AIR READINGS ABOVE
BACKGROUND ON OVA OR HNU IN WELL ZONE
OR BREATHING ZONE COND. 150 uV/cm (x2) SCALE
RAD. 5uR/HR

1055 SAMPLERS OFF AIR BEGIN SETTING UP EQUIPMENT
TO PUMP OUT WELL

1100 P CICOLELLO SETTING UP EQUIPMENT FOR SAMPLING
1105 R SCERBO ON RESP P. CICOLELLO ON RESP.

1110 BEGIN BAILING WELL WATER COLOR LT BRN PH 6
NO READINGS ABOVE BACKGROUND ON AIR / RAD

1115 BAILED ~ 2.5 GAL pH 6 ~~200~~ uV/cm
WELL HAS GOOD RECHARGE 151

1120 COMPLETED BAILING WELL FINAL pH 6 151 uV/c
WILL WAIT FOR RECHARGE EVAC ~ 4.9 GAL
NO AIR / RAD READINGS ABOVE BACKGROUND

[signatures]

WATER LEVEL AFTER BAILING - 2' APPROX
SAMPLERS CHANGING LATEX GLOVES. DUMPED
EVAC WATER INTO 55 GAL DRUM. SAND
& SILT IN BOTTOM OF PAIL

1135 BEGIN COLLECTING SAMPLE GW1 ACIDIFYING
WITH 5 DROPS HCL RECHECK GW LEVEL 1'1"

1140 TAKING PHOTO OF SAMPLERS COLLECTING VOA
SAMPLE 1-P1/S1

1150 SAMPLERS CONTINUING COLLECTING GW 1 SAMPLE

1200 COMPLETE COLLECTING SAMPLES, CONDUCT FIELD
DECON W/ TAP WATER, PACK UP EQUIPMENT
TO MOVE TO LOCATION GW 5

1205 MOVING TO LOCATION GW 5

1215 BEGIN COLLECTING EQUIPMENT FROM TRUCK
TO ~~SET~~ SET UP AT GW5 MONITOR WELL LOCATION

1230 COMPLETE MOBILIZATION TO SAMPLE LOCATION
LOCK WONT OPEN WILL CUT OFF LOCK AREA
AROUND WELL HAS PONDED WATER WILL
SETUP OFF TO SIDE ON DRY AREA

1235 SAMPLERS R. SCERBO & P. CICOLELLO ON AIR
CVA 80 PPM 10-20 HNU IN WELL BORE
WATER LEVEL 9' FROM TOP OF INNER CASING DEPTH OF WELL
20' 1 HBP TO TOP OF CASING (INNER)
STICKUP 33"

100546

1240 OFF AIR TO CHANGE BOTTLES

1245 SAMPLERS BACK ON AIR CVA 40 ppm HNu 60

1250 BEGIN BAILING WELL pH 7 COND 1. uM/cm
WATER IS DARK GREENISH BROWN - BLACK BROWN
40 ppm CVA OFF BUCKET CONTAINING PURGE
WATER

1300 COND & PH SAME AS PREV. READINGS WATER
QUALITY HAS NOT CHANGED AT ~3 GAL.
PURGED

1305 WELL CONFIRMED DRY BAILED SAMPLERS
OFF AIR WHILE WELL RECHARGING FINAL
READINGS FOR COND & pH

1310 SAMPLERS & B. CARSON DEPART FROM ~~GW~~ GW 5 LOCATION
TO DROP OFF SAMPLES & COLLECT AIR BOTTLES
TO CONTINUE WORK AFTER WELL RECHARGES

1320 WAITING ON CREW TO RETURN

1340 CREW RETURNED ON LEVEL C, CHECKING WELL
WATER LEVEL. AT 11'0" WILL MOVE OVER
TO GW 9 LOCATION THEN RETURN TO SAMPLE

1400 ARRIVE AT WELL GW 9 LOCK WENT OPEN.
CUT OFF LOCK. WELL STICKUP 30"

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[signature] 4/ /
[signature]

62-9003-01 LI TUNGSTEN NYSC &I 10

1405 NO AIR READINGS ABOVE BACKGROUND ON OVA OR HNU IN WELL BORE GW 4'10" TOP OF OUTER CASING. DEPTH OF WELL TO TOP OF OUTER CASING 21'2" uM/cm 8.14 (x2 scale) RAD. 8 uR/HR BACKGROUND OFF AIR 1408

1410 SITE CONSULTANT LEFT TO MAKE PHONE CALL CREW SETTING UP TRASH PUMP WILL EVAC. 8-10 GAL FROM WELL

1415 BEGIN EVACUATING WELL. WELL FLOWING

1419 EVACUATED WELL DRY ~ 8-9 GAL

1425 CLOSED WELL. RETURNING TO GW 5 SAMPLE LOCATION. DO NOT EXPECT TO GET ENOUGH WATER OUT OF THIS LOCATION FOR A DUP SAMPLE. WILL COLLECT DUP AT GW 9 LOCATION

1430 SAMPLERS R. SCERBO/P CICOLELLO ON RESP. COND 1. uM/cm (x2 scale)

1445 BEGIN COLLECTING GW 5 SAMPLE. TEST VIAL 5 DROPS HCL DID NOT AFFECT PH ADDITIONAL 5 DROPS SAMPLE (10 TOTAL) CAUSED SAMPLE TO FOAM, WILL NOT ACIDIFY SAMPLES PHOTO 1 - P2/S2

1450 BAILED WELL DRY SAMPLING WILL WAIT FOR RECHARGE TO COMPLETE SAMPLE CONS. RETURNED TO SITE.

4/20/10

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02-9003-01 LI TUNGSTEN NYSL&I 1

1515 WAITING ON WELL TO RECHARGE

1520 COMPLETE COLLECTING GW5 SAMPLE PACK UP EQUIPMENT RINSE OFF ALL SAMPLES & EQUP. WITH TAP WATER

1525 DEPART FOR GW 9 SAMPLE LOCATION THIS SAMPLE WILL ALSO BE GW 10 DUPLICATE.

1530 CREW ARIVES AT GW9 LOCATION TO BEGIN SET UP FOR SAMPLING

1534 R SCORZO, P. CICELLO ON RESPIRATORS

1536 DEPTH TO WATER FROM TOP OF CASING 12'11" uM/cm 6.95 - 7.15 NO AIR READINGS ABOVE BACKGROUND IN WELL OR BREATHING ZONE

1545 WELL pH 6 ACIDIFYING W/ 10 DROPS HCL BEGIN COLLECTING VOA SAMPLES TAKING PHOTO OF SAMPLE COLLECTION. ~~Cam~~ 6D 1-P3/53

1550 CONSULTANT WENT UP TO LOCK ACCESS GATE TO AREA PREVIOUSLY SAMPLED

1600 COLLECTING SAMPLES

1605 COMPLETE COLLECTING GW 9 & 10 RINSING ALL BOTTLES, EQUIPMENT WITH TAP WATER

1610 SAMPLERS OFF RESPIRATORS, EQUIPMENT BEING LOADED IN TRUCK

100549

4/30/90

1615 RETURN TO DECON AREA TO DROP OFF SAMPLES AND DECON

1630 CONTINUING DECON OF SAMPLES

1650 PACKING UP TRUCK TO COLLECT LAST GW SAMPLE FOR TODAY GW 4

~~16~~
1700 DEPART FOR SAMPLE LOCATION GW 4

1705 LEAVE CREW IN PARKING AREA AT GW1 TO FIND ACCESS ROUTE TO GW 4 LOCATION. UNABLE TO ACCESS FROM SITE HAD FOUND WELL ON OTHER SIDE OF FENCE. FOLLOWED FENCE TO OPENING ON NORTH SIDE THEN FOLLOWED BACK TO PARKING AREA WALKING DOWN DICKSON LANE.

1720 CREW DEPARTS FOR SAMPLE LOCATION

1745 CREW ON AIR B. SCERBO / P. CICCLEO
CVA NOT WORKING HNU NO READING ABOVE BACKGROUND
45' 0" TO WATER TABLE (.272 uM/cm) TOPOF CASING
56' 7" TO BOTTOM OF WELL

1755 CREW OFF AIR

1800 ON RESPIRATORS TO BEGIN BAILING WELL
INITIAL pH ~5.5

[signatures] 4/9/92

100550

1807 BAILED ~2 GAL PH 5.5 .306 uM/cm
CONTINUING WELL EVACUATION

1815 COMPLETE BAILING 5 GAL FROM WELL
RUN IN COND. METER. SAMPLED ON
WATER PH 5.5

1820 UNJAMMED COND METER COARD FINAL WELL
WATER DEPTH 45'0" .294 uM/cm READING
6 uR/HR OFF OF PURGE WATER

1825 BEGIN COLLECTING VOA 10 DROPS HCL
NEEDED TO ACIDIFY SAMPLE BELOW PH 2

1830 PHOTO OF SAMPLERS COLLECTING GW 4 SAMPLE
1-P4/S4

1845 CONTINUING COLLECTING SAMPLE GW4

1850 COMPLETE SAMPLING, CLOSE WELL & FIELD
DECON SAMPLE BOTTLES WITH TAP WATER

1855 RETURNING TO TRUCK

1910 RETURN TO DECON AREA

~~X~~ NOTES ON COMPLETION OF THE DAYS
ACTIVITIES ARE IN THE SITE MANAGERS
FIELD NOTEBOOK.

[illegible signature] [illegible signature] 4/10/90

CT-9003-01 Li Tungsten NY 54 SL

4/19/90

Utilizing same Radio Cameras, Mini Rad & HNu as on 4/18/90

OVA (M) EPA# 469784

Field Crew

G. Pollack SM
J. Tesson SSO SCBA # 307168
R. Carson Rad. Survey
R. Scerbo Sampler SCBA # 478552
M. Gallagher Sampler SCBA # 307186

0930 Depart from Decon Area for GW 2 Sample location

0940 Crew preparing to open well on Level B Setting up equipment next to well

0945 Crew on ~~Air~~ R. Scerbo / M. Gallagher initially no air readings above background on OVA or HNu in well bore or breathing zone Depth to water 14'6" .239 ul/cm Depth of well 23'2" to top of casing

0950 Crew off Air

0955 Crew on Respirators prepping equipment to Bail out well No air readings above background Initial pH 6 color Lt Brown

100552

0A-9003-01 L I Tungsten NYSDEC

1005 uM/cm .253 pH 6 ~ 1.5 GAL
BAILED FROM WELL. CONTINUING WELL
EVACUATION

1020 CONTINUE BAILING WELL FINAL pH 6
uM/cm , 250 EVACUATED ~ 4.25 GAL
8-9 ppm HNu DEPTH TO WATER 14'3" TO TOP
OF CASING

1030 BEGIN COLLECTING GW 2 SAMPLE
ACIDIFY SAMPLE W/8 DROPS HCL TO
pH <2. TOOK PHOTO OF SAMPLE BEING COLLE
1-P5/S5

1045 CONTINUING COLLECTING GW 2 SAMPLE NO
AIR READINGS ABOVE BACKGROUND IN WELL,
OFF SAMPLES, OR IN BREATHING ZONE

1100 COMPLETE COLLECTION OF SAMPLE BEGIN
PACKING UP EQUIPMENT SAMPLERS OFF
RESPIRATORS

1105 RETURN TO DECON AREA DROP OFF SAMPLE
DECON BAILER FOR NEXT WELL

1145 DECON COMPLETE SETTING UP EQUIPMENT
AT LOCATION GW 3 SCREENING W/OVA

1150 SAMPLERS R. SCIEBO / M. GALLAGHER ON AIR
NO INITIAL AIR READING ABOVE BACKGROUND
W/OVA

4/20/91 [illegible] 5/2/91 [signature] 4/19/91

02-9003-01 LI TUNGSTEN NYJL&I

GW DEPTH 4'6" FROM TOP OF CASING, DEPTH OF WELL 23'10" TO TOP OF CASING uM/cm .651
STICKUP 7.5"

1155 SAMPLERS OFF AIR PUTTING ON RESPIRATOR
BACKGROUND 14 uR/HR

1205 RUNING IN SUCKTION LINE FOR TRASH PUMP

1210 uM/cm .073 pH 5 COLOR ORANGE BROWN
INITIAL READING ~ 4 GAL EVAC
1215 uM/cm .788 pH 5.5 COLOR ORANGE BROWN
SECOND READING ~ 8 GAL WILL COLLECT/PURGE
ADDITIONAL VOLUME

(51) 4/19/90

~~1520~~ 1220 FINAL ~~READING~~ PURGED ADDITIONAL ~ 7 GAL
uM/cm .780 pH 5.5 10 uR/HR FROM SAMPLE
COMPLETED WELL EVACUATION, GOOD RECHARGE
BEGIN BREAK DOWN OF PURGE EQUIPMENT
& PREPAIR FOR SAMPLING

(61) 4/19/90

~~1525~~ 1225 SAMPLERS OFF RESPIRATORS TAKING A BREAK

(61) 4/19/90 ~~1530~~ 1230 SAMPLERS BACK ON RESPIRATORS DEPTH TO GW 4'6
uM/cm .699

1235 BEGIN COLLECTING GW 3 SAMPLE ADDED
6 DROPS HCL TO ADJUST pH TO <2
TOOK PHOTO OF SAMPLES BEING COLLECTED
1-P6/S6

[signature] 4/2/90 [signature]

02-9003-01 LI TUNGSTEN NYJL $[illegible]

1250 CONTINUING COLLECTION OF GW 3 SAMPLE

1300 CONTINUING COLLECTION OF GW 3 SAMPLE

1305 COMPLETE COLLECTION OF GW 3 SAMPLE. CREW BEGINNING CLEAN UP OF SAMPLE AREA, LOCKING WELL

1310 RETURN TO DECON AREA

1320 G. POLLACK S. OKULUWITZ R. CARSON ON (& J TECSON) RESPIRATORS TO REVIEW GW8 & SW 10 LOCATION. FOR ACCESS BY TRUCK, VERY DRY DUST BLOWING AROUND BUILDING FROM WASTE AREA

1330 VIEWED SAMPLE POINTS UNABLE TO DRIVE TO LOCATION WILL CARRY EQUIPMENT

1335 RETURN TO DECON INFORM CREW TO STAGE EQUIP J. TECSON OFF RESP. REST OF CREW WILL PROCEDE TO GW 7 LOCATION

1345 DECON COMPLETED ALL PERSONEL OFF RESP

1405 R. CARSON J. TECSON M. GALLIGHER R. SCERBO G. POLLACK ON RESP TO MOVE EQUIPMENT TO GW 8 LOCATION

1415 R SCERBO / M GALLAGHER ON AR TO CHECK WELL 2'9" TO GW (FLUSH CABINET) 10'6" TO BOTTOM OF WELL uM/cm (x2) .23 4" WELL MUST EVAC 15 GAL

[illegible] [signature]

02-90034   LI TUNGSTEN   NYSL $I

1430 PORTION OF CREW RETURNING TO DECON AREA TO LEAVE SCBA'S & COLLECT TRASH PUMP TO EVAC WELL

1445 CREW RETURNS WITH EQUIPMENT TO EVAC. WELL WITH PUMP. UTILIZING A 10 GAL TUB & A 5 GAL PAIL BEGIN EVAC WELL COLOR ~~GD~~ DK GREY BROWN SLIGHT SHEEN 2PPM OVA

1450 EVAC WELL pH 6 .971 uM/cm FINAL READINGS FROM PURGE WATER EVAC DEPTH 4' BELOW CASING WILL WAIT FOR WELL TO STABILIZE.

~~1500~~ 1505 GD 4/19/90 BEGIN COLLECTING SAMPLES from GW-7 AF 5/2/90 ADDING 6 DROPS HCL TO LOWER pH TO LESS THAN 2

1510 TOOK PHOTO OF COLLECTION OF GW ~~8~~ 7 GD SAMPLE 1-P7/S7

1520 COMPLETE COLLECTION OF GW ~~8~~ 7 GD SAMPLE SAMPLERS CHANGING LATEX GLOVES TO COLLECT SW 10 SAMPLE FROM NEARBY DOORWAY INTO BUILDING

1530 INITIAL PH 6 ~~GD~~ FOR SW 10 LOCATION ADDED 6 DROPS HCL TO pH <2 BEGIN COLLECTING SW 10 SAMPLE TOOK PHOTO OF SAMPLERS COLLECTING VOA PORTION. WILL USE A BOWL TO COLLECT REST OF SAMPLE. WATER ON FLOOR ~ 3" DEEP. TAKING PHOTO NO 1-P8/S8.

[signature] 5/2/90   [signature] 4/19/90

02-9003-01 LI Tungsten NYSDEC

1545 Complete collecting SW 10 samples. Pack up equipment, return to Decon Area

1610 Moved Decon drum & purge water drum with help of Cons. to secure location.

1625 Depart from Decon Area with equipment for GW 8 location All Prev. Crew on Level C

1635 M. Gallagher / R. Scerbo on Air (Level B) uM/cm .733 13" to GW Depth of well No air readings on OVA above background Depth of well 10'3" to surface (Flush mount

1640 Samplers off Level B back on Level C Returning to Decon area to collect rest of sample equipment

1650 Sample crew returns to GW 8 location (Miss labled last location sample bottles used from GW 7 will revise location and notes as to sample number)

1655 Begin well evacuation with bailer pH 6 .733 uM/cm (x2) No air readings above background off of purge water

5/2/90 4/19/90

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22

02-9003-10 LI Tungsten NYJL $I

1700 Final pH 6 .729 uM/cm (x2)
Wait on well to recover

1715 Added 6 drops HCL to acidify to pH<2
Begin collecting GW & sample
Taking photo of sampling 1-P8/S8
1725 Complete sampling, seal well,
Pack up equipment & return to
Decon area

1730 Return to decon area all sampling
completed will begin sample and
equipment decon

1745 Begin transfer of decon water from
open top drum to sealed drums

* Notes on the completion of the days
activities are in the site managers
field log book.

[signature] 5/5/?? [signature] 10/10/9?

0057F
02-9003-01

NUS CORPORATION

II

0579

NJD 982280651

DIRECT
ENVIRONMENTAL INC.

Complete "Hands-on"
Environmental Remediation
Contractor

Michael O. Flynn, Jr.

66-B Otis Street
West Babylon, N.Y. 11704
516/253-0900
FAX: 516/253-0105

Li TUNGSTEN 02-9003-01 5/15/90

0910 DECONNING OF SAMPLING EQUIPMENT; PERSONNEL FROM DIRECT ENVIRONMENT ARRIVE TO REMOVE EMPTY DRUMS FROM SITE

0950 LEAVING TO TAKE SW1/SW3 AND SED1/SED2 SAMPLES; RICH PERNACE, JOE FIOSA, PHIL C A STAGE O ON RESPIRATORS

1000 ARRIVE AT OIL RECOVERY SUMP - FULL OF WATER NO READINGS ABOVE BACKGROUND ON VICTOREEN RAD METER, OVA OR HNU

1005 SW-1 VOAs COLLECTED FROM SUMP BY PHIL C, AMBER BOTTLES AND POLY BOTTLES FILLED VIA STAINLESS STEEL SCOOP, S1/P1 PHOTOS WEST VIEW.

1006 pH OF WATER FROM SUMP = 6, TESTED VIA pH PAPER

1010 4 DROPS OF HCl ADDED TO GET A pH OF 2 FOR VOAs NO REACTION NOTED

1015 PHIL C COLLECTS SW3 FROM OIL RECOVERY SUMP S2/P2 PHOTOS; LOOKING EAST (DUP OF SW-1)

1016 ~~0.3~~ mR/HR RADIATION READINGS FROM SAMPLE BOTTLES off scale 0.03 CONTAINING WATER SAMPLE FROM SUMP

1020 VIEW OF OIL RECOVERY SUMP S3/P3 PHOTOS LOOKING SOUTH

[signature] 5/16/90 [signature] 5/21/90

5/21/90

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LI TUNGSTEN 02-9003-01 5/15/90

1030 EAST VIEW OF WAREHOUSE BUILDING SHOWING STACKED DRUMS AND FLOODED FLOOR 54/P4 PHOTOS

1035 VIEW OF GLEN COVE CREEK AT LOW TIDE EAST LOOKING; 55/P5 PHOTOS

1040 RETURN TO DECON SAMPLES; CREW OFF RESPIRATOR

1100 SEND BOB SCOTTSO TO GET ROPE FOR PONAR DREDGE

1105 PREPARING TO GET SAMPLES FROM DRUMS OF DECON WATER AND PURGE WATER - COLLECTED ON LEVEL B - JOE FILOSA AND PAUL C, RICH FLEMMING ON LEVEL B BACKUP

1110 SCBA AIR TANK UPS - R.F. (BACKUP)
ON AIR J.F
ON AIR P.C

1115 100 PPM ON OVA } ON DECON WATER DRUMS
15 PPM ON HNU }

1117 DRUM SEALED BY JOE FILOSA

1119 PURGE DRUM OPENED BY JOE FILOSA
15 TO 20 PPM ON OVA
NO READINGS ABOVE BACKGROUND ON HNU

[signature] 5/16/90 [initials] 5/21/90

LI TUNGSTEN 02-9003-01 5/15/90

1125 JOE FILOSA CLOSES PURGE WATER DRUMS

11:27 RETURN TO DECON AREA, BOB SCERBO RETURNS FROM HARDWARE STORE

1130 JOE FILOSA AND PHIL C OFF AIR

1145 PREPARING TO LEAVE FOR SUMPS TO TAKE SED 1/2 CREW BACK ON RESPIRATORS

1150 ARRIVE AT OIL RECOVERY SUMP - PHIL C TO COLLECT SAMPLE USING PONAR DREDGE

1155 0.05 mR/HR ON SEDIMENT SAMPLE FROM SUMP NO READINGS ABOVE BACKGROUND ON OVA/HNU; SED 1/SED 2 SEDIMENT IS GREEN, BLACK AND ORANGE; SANDY

1205 PHIL C. COLLECTS SED 1 FROM OIL RECOVERY SUMP; S6/P6 PHOTOS LOOKING WEST, THIS WILL BE MS/MSD SAMPLE

1210 PHIL C COLLECTS SED 2 (DUP OF SED 1) FROM OIL RECOVERY SUMP S7/P7 PHOTO LOOKING WEST

1235 RETURN TO DECON AREA, CREW OFF RESPIRATORS CLEANING OFF SAMPLE JARS AND SAMPLING EQUIPMENT FOR SAMPLE MANAGEMENT OFFICER

1300 LEAVE TO TAKE SW 2 FROM EAST BUILDING, CREW ON RESPIRATOR

1305 ARRIVE AT EAST BUILDING JOE FILOSA WILL SAMPLE SURFACE WATER FROM EAST BLDG. FLOODED FLOOR; COLLECTED IN OPEN DOORWAY

1306 - NO READINGS ABOVE BACKGROUND ON OVA/HNU/VICTOREEN RAD METER [illegible]

5/15/90
Li Tungston
02-9005-01

RINSATES COLLECTED IN FIELD — TIME

RIN-1 SCOOP	1005
RIN-2 DREDGE	0935
RIN-3 BOWL	1025
RIN-4 TROWEL	1045
TRIP BLANK	0900

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[signature] 5/15/90 [signature] 5/21/90

TIME
305
35
5
5

LI TUNGSTEN 02-9003-01 5/15/90 7

1307 pH of WATER IS 6-7, VOA ACIDIFIED WITH 3 DROPS of HCl; THIS SAMPLE TO BE MS/MSD

1315 JOE FILOSA COLLECTS SW 7 FROM FLOODED FLOOR of EAST BLDG - S8/P8 PHOTOS LOOKING EAST

1316 VIEW of TANKS LOOKING ~~NORTHEAST~~ NORTHWEST (JO 5/15/90) CONTAINING HCl S9/P9 PHOTOS, WEST of EAST BUILDING

1317 VIEW of RUSTED DRUMS CONTAINING ORE LOOKING NORTHWEST - S10/P10 PHOTOS, OUTSIDE EAST BLDG.

1318 CRATE ~~LAND~~ ~~CONTAINING~~ CONTAINING (JO 5/15/90) ORE LOOKING WEST PHOTOS S11/P11, OUTSIDE of EAST BLDG.

1330 RETURN TO DECON AFTER FINISHING COLLECTION of SURFACE WATER SAMPLE FROM EAST BUILDING CREW OFF RESPIRATORS AT DECON AREA

1340 BEGINNING TO BREAK DOWN DECON AREA, AIR INSTRUMENTS SHUT DOWN; ALL PERSONNEL SCANNED WITH RAD METER DURING FINAL DECON.

1400 WRAPPED 4 DRUMS CONTAINING DECON WATER AND PURGE WELL WATER IN PLASTIC; ALL DRUMS LABELED FOR CONTENTS AND ORIGIN; DECON WATER PLACED IN DRUMS, ALL DRY WASTES BAGGED AND DISPOSED of OFF SITE

1450 FINISH BREAKING DOWN DECON AREA, SENDING 4 COOLERS TO FEDEX, EDISON, N.J. FACILITY

1500 LEAVE SITE - END of DAY

1530 ARRIVE AT EDISON FED EX, DROP OFF 4 COOLERS of SAMPLES [illegible]

100565

190

LI TUNGSTEN 02-9003-01 5/16/90

0930 SAS SAMPLE COOLER SECURED IN ARCHIVE BUILDING AT EPA REGION 2 HEADQUARTERS IN EDISON, N.J.; RCRA SAMPLES IN COOLER DEPOSITED ADJACENT TO SAS COOLER.
DARKER COLORED SAMPLE (RCRA) IS WELL PURGE WATER, LIGHTER COLORED IS DECON WATER SAMPLE

[illegible] 5/16/90 [illegible]

SOURCE LIST

Bayshore Environmental
41 Sandpipe Lane
Coram, New York 11727
(718) 442-3879
Attn: John DeLeo

Chemical Pollution Control Inc.
120 South Fourth Street
Bayshore, New York 11706
(516) 586-0333
Attn: Tom McGlennon

Marine Pollution Control
P.O. Box 2220
East Patchogue, New York 11772
(516) 654-4900
Attn: James Davey

RGM Liquid Waste Removal Corp.
972 Nicolls Road
Deer Park, New York 11729
(516) 586-0002
Attn: Dan Rivers

Waste Conversion (Stout Environmental)
Box 599
Thorofare, NJ 08086
(609) 384-8000
Attn: Laurie Palko

LI TUNGSTEN 02-9003-01 5/31/90 9

1100 – RETURNED TO ARCHIVE ROOM TO ICE RCRA SAMPLE CONTAINERS IN PREPARATION FOR LAB SHIPMENT

1140 – RETURNED TO NUS, EDISON

~~RCRA~~

5/31/90

100568

LI TUNGSTEN 5/16/90
02-9003-01

SAMPLE SUMMARY
CASE # 14115

ORGANICS LABORATORY: NET MID-ATLANTIC INC.
100 GROVE ROAD
THOROFARE, NEW JERSEY
08086
ATTN: PATRICIA WILL

AIR BILL No. 6625946471
SHIPPED 5/15/90
VIA FED-EX
EDISON, N.J.

INORGANICS LABORATORY: BETZ LABORATORIES
4636 SOMERTON ROAD
TREVOSE, PA
19047
ATTN: ANNE KENNELLY

AIR BILL No. 6625946460
SHIPPED 5/15/90
VIA FED-EX
EDISON, N.J.

NUS ID #	ORGANIC #	INORGANIC #	TYPE
NYJL-SW1	BDK63	MBCP-89	SURFACE WATER
NYJL-SW2	BDK64	MBCP-90	SURFACE WATER
NYJL-SW3	BDK65	MBCP-91	SURFACE WATER
NYJL-SED1	BDK66	MBCP-92	SEDIMENT
NYJL-SED2	BDK67	MBCP-93	SEDIMENT
NYJL-RIN1	BDK68	MBCP-94	SCOOP RINSATE
NYJL-RIN2	BDK69	MBCP-95	DREDGE RINSATE
NYJL-RIN3	BDK72	MBCP-96	BOWL RINSATE
NYJL-RIN4	BDK73	MBCJ-65	TROWEL RINSATE
NYJL-TBLK1	BDP03	———	TRIP BLANK

100569

[illegible signature]

LI Tungsten 02-9003-01 6/21/90 11

CUSTODY of THIS LOGBOOK IS TRANSFERRED to JOE FILOSA,
6/20/90

RCRA Sampling event 6/21/90

Personell on Site			Responsibilities
Joe Filosa	JF	6/21/90	SM
Tom Varner	TV	6/21/90	SSO
Rich Settimo	RS	6/21/90	Sampler

The Above Personell have read And under STood The work plan

Weather Conditions: Cloudy 70°F humid Chance of Rain winds 0 to 3 mph. out of the west.

10:15 Arrive AT Site Await Arrival of Suzanne morrissey of Hart Environmental

Monitoring Instruments		Background
OVA #K	469782	3 ppm
HNU L	469748	1 ppm
mini RAd	469785	18 cpm

100570

L. Tungsgen 02-9003-01

6/21/90

10:20 Tom Varner Conducts Tailgate Site Safety meeting

Personell present

Tom Varner SSO [signature] 6/21/90

Joe Filosa SM [signature] 6/21/90

Rich Setting sampler [signature] 6/21/90

Topics discussed: Radiation, heat stress, Asbestos, levels of Respiratory protection to be utilized

10:25 met Suzanne Morrissey of Hart & she informed me that the locks to the main gate had different locks on it and that we could not get in because they put different locks on it & Suzanne did not have a key so we decided to saw through the chain to get in

1030 Begin setting up decon area

1037 J Filosa saws through the chain on main gate R Setting & T Varner suit up

1053 OVA ignites & passes marker test hnu OK & passes marker test hnu zeroed on 1ppm

1055 Tom & Rich conduct SCBA Checkout Joe F suits up

100571

[signature] [signature]

LI Tungsten 02-9003-01

6/21/90

1113 Tom + Rich on AIR Joe on level B Back up

1115 Enter site proceed to drum area Suzanne did not enter site.

1116 4 ppm recorded on OVA Ambient Air Sample around the Drum

1119 Rich Serrino opening Decon H_2O Drum readings of 75 ppm on OVA 3 ppm on HNU

1124 Rich Serrino opening well water purge Drum

1128 readings of 3 ppm ~~OVA~~ on OVA + 0 ppm on HNU

1130: Tom + Rich return to decon area to retrieve sample cooler

1134: Tom + Rich collect sample DR-1 from well water Drum

1136: Tom + Rich collect sample DR-2 from Decon water Drum

1138 Tom + Rich close ~~Deco~~ 6/21/90 well water Drum

1139 Rich Serrino 5 minutes air left

1141 Return samples to Decon area
Rich Serrino off Air Tom taken off Air.

[illegible] 6/21/90 [illegible] 6/21/90

100573

L I Tungsten 07-9003-01 1.

6/21/90

1145 Tom + Rich Switch Air Bottles
1146 Decon Samples For Shipment.

1149 Switched JE Tanks w/ Tom Varner due To Fact That O Ring on SCBA was Lost

~~1056~~ 1156 JE Tom + Rich prepare pump
Joe F prepares Samples For Shipping

~~1056~~ 1156 JE Rich + Tom Back on Air & proceed To Drum area

1215 Tom + Rich Pumping Drum
Samples ready for Shipment

1217 Pumping of Drum completed.

1220 Tom + Rich return To Decon Area
Tom Varner 5 minutes of Air left

1222 Tom + Rich OFF AIR.

1224 Begin Dismantling Decon Area

1240 Rich S Back on Air To Dump
Decon H_2O back into Drum

1246 Tom Varner on Air Tom + Rich
Dump Decon H_2O into the Drum

[signature] 6/21/[illegible] [signature] 6/21/90

LI Tungsten 02-9003-01

~~1252 Tom + Rich OFF Air 6/21/98~~

1305 Complete Dismantling Decon Area

1310 ~~1305~~ Leave Site For Fed X in ~~[illegible]~~ [illegible] 6/4/98 Mineola

Mineola [illegible] 6/4/98

1352 Arrive At Fed X ~~[illegible]~~ And ship samples on Airbill # 7212650460

Custody of This Logbook is Transfered back To Steve Okulewicz [signature] 6/29/00

[signature] 6/21/00 [signature] 6/20/00

LI TUNGSTEN 02-9003-01 6/22/90

TWO RCRA SAMPLES WERE SHIPPED VIA FEDERAL EXPRESS ~~#~~ AIR BILL No. 7212650410 ON 6/21/90 AT 1352

TO: STOUT ENVIRONMENTAL
101 JESSUP ROAD
THOROFARE, NEW JERSEY
08086
609-384-8000
ATTN: LAURIE PALKO

SAMPLE No.	TYPE
NYJL-DR1	1-32 OZ GLASS JAR of LOW CONCENTRATION WATER – FROM WELL PURGING
NYJL-DR2	1-32 OZ GLASS JAR of LOW CONCENTRATION WATER – FROM DECONTAMINATION WATER

100575

[illegible] 6/22/90

Li TUNGSTEN 02-9003-01 7/13/90

NUS PERSONNEL ON SITE | RESPONSIBILITY

STEVEN OKULEWICZ | SITE MANAGER
JOE FILOSA | SURVEILLANCE
WINTHROP FRAME Winthrop Frame | SURVEILLANCE

PURPOSE OF VISIT TO Li TUNGSTEN FACILITY: OBSERVE REMOVAL OF 4 55-GALLON DRUMS OF NON-HAZARDOUS WELL PURGE WATER, THAT WERE GENERATED DURING PREVIOUS SAMPLINGS THAT OCCURRED ON 4/18/90, 4/19/90, 5/15/90, AND 6/21/90.

ALL 4 DRUMS WERE SEALED WITH EITHER SCREW BUNG HOLES OR LOCKING RINGS AND ALL DRUMS WERE LABELLED FOR THEIR CONTENTS.

THE DRUMS WERE PREVIOUSLY STAGED ADJACENT TO THE MAIN GATE ON HERB HILL ROAD BEHIND A LOCKED FENCE AND GUARDED GATE.

SITE SAFETY MEETING HELD DURING BREAKFAST AT HOTEL BY STEVE OKULEWICZ

ALL OF THE ABOVE PERSONNEL HAVE READ AND UNDERSTOOD THE WORK PLAN

Steve Okulewicz 7/13/90

100577

18

LI TUNGSTEN 7/13/90
02-9003-01

SUBCONTRACT No. PO900507 - WASTE CONVERSION (STOUT ENVIRONMENTAL)

08:05 ARRIVE ON SITE, SIGN IN WITH GUARD
TRUCK ~~#~~ NJDEP 15718LD; OPEN GATE WITH KEY FROM WART ENVIRONMENTAL

0815- TRUCK BACKS INTO LOT, LABEL DRUMS WITH NON-HAZARDOUS LABELS
TRUCK LICENSE PLATE TM-89779 - PENNSY.
VEHICLE # 7008 EXPIRES: 9/30/90
OBTAINED COPY OF DRIVER 40 OSHA TRAINING

0825 TIGHTEN ONE DRUM; REPLACE ONE GASKET WITH NEW ONE SO IT WILL NOT LEAK

0840 LOAD DRUMS ON TRUCK; NAME ON TRUCK IS WASTE CONVERSION INC. HATFIELD, PA.

0855 FINISH LOADING DRUMS-4- ON TRUCK

0905 CALL OFFICE ABOUT MANIFEST SIGNATURE & DATE; STEVE O CHANGES DATE AND INITIALS IT.

0920 DRIVER & TRUCK LEAVE SITE

0940 LOCK GATE, LEAVE SITE, SIGN OUT WITH GUARD, MOVE TO MUD POND AREA ON GARVIES PT ROAD

0955 MUD POND IS APPROXIMATELY 2 FEET DEEP, MUD HOLES ARE ABOUT 1 FOOT DEEP
HEIGHT OF BERMS AROUND TANK IS 3 FEET
NO BERM AROUND MUD POND, AS VIEWED FROM OFFSITE OVER FENCE

[signature] 7/13/90

DANIEL E. RUSSELL
City Historian

City Hall
Bridge Street
Glen Cove, N.Y. 11542

516-676-6535

1015 INTERVIEW WITH CITY ENGINEER AT CITY HALL
IN GLEN COVE
1040 GLEN COVE CREEK DREDGED 20 YRS AGO;
MEAN CONTROL DEPTH NOW IS 3 FEET - HARBOR
MASTER INFO; HE SAYS NOT TO TRUST
SEDIMENT RAD SURVEY DONE BY STATE, DID NOT
GO DEEP ENOUGH INTO SEDIMENT

ALSO, RAD WASTE WAS REPORTED TO BE DUMPED
IN GLEN COVE LANDFILL AT END OF GARVIES POINT
ROAD ON SOUTH SIDE, UNLINED; MUNICIPAL LANDFILL;
THERE MAY BE A VAULT OF BURIED ISOTOPE STORAGE
IN VICINITY OF LAB BLDG, NOT FOUND
AS YET BUT MAY BE BENEATH PILE OF DRUMS;
OBTAINED MANY NEWSPAPER CLIPPINGS, MAPS
OF SEWER SYSTEM, CORRESPONDENCE, TECHNICAL
DATA ON ORE PROCESSING, ETC. FROM HISTORIAN;
DANIEL E. RUSSEL SAYS THAT THE
55,000 GAL TANK BUILT BY HAWKINS FUEL
OIL COMPANY FOR THEIR USE AND RENTAL
FROM LI TUNGSTEN
1946 MAP - LOTS GOOD DETAIL IN AERIAL
PHOTO

LANDFILL USED BACK TO 1940's
516-6766535 - DAN E. RUSSELL

1150 LEAVE CITY HALL, RETURN LI TUNGSTEN
1P1 - NW VIEW OF CONDO FOUNDATIONS
UPON OLD GLEN COVE LANDFILL AREA;
1P2 OPEN LAND ON LANDFILL
LOOKING NORTH
1200 FINALLY LEAVE SITE

100579

[illegible]

LI TUNGSTEN
02-9003-01

PHOTO LOG OF SITE INSPECTION - 5/15/9[illegible]

ALL PHOTOS TAKEN BY STEVEN OKULEWICZ

ROLL #	PICTURE/SLIDE #	TIME	DESCRIPTION
1	1P/1S	1005	PHIL CICCOLELLO COLLECTS SURFACE WATER SAMPLE SW-1 FROM OIL RECOVERY SUMP, LOOKING WEST
1	2P/2S	1015	PHIL CICCOLELLO COLLECTS SURFACE WATER SAMPLE SW-[illegible] FROM OIL RECOVERY SUMP, LOOK[illegible] WEST
1	3P/3S	1020	VIEW OF OIL RECOVERY SU[illegible] LOOKING SOUTH
1	4P/4S	1030	EAST VIEW OF WAREHOUSE BUILDING SHOWING STACKED DR[illegible] AND FLOODED FLOOR
1	5P/5S	1035	EAST VIEW OF GLEN COVE CREEK AT LOW TIDE
1	6P/6S	1205	PHIL CICCOLELLO COLLECTS SEDIMENT SAMPLE SED-1 FR[illegible] OIL RECOVERY SUMP, LOOKIN[illegible] WEST

100580

[illegible]

L.S TUNGSTEN
02-9003-01

PHOTO LOG CONTINUED

ROLL #	PICTURE/SLIDE#	TIME	DESCRIPTION
1	7P/7S	1310	PHIL CICCOLELLO COLLECTS SEDIMENT SAMPLE SED-2 FROM OIL RECOVERY SUMP LOOKING WEST
1	8P/8S	1315	JOE FILOSA COLLECTS SURFACE WATER SAMPLE SW-3 FROM FLOOR OF EAST BUILDING LOOKING EAST
1	9P/9S	1316	NORTHWEST VIEW OF TANKS CONTAINING HYDROCHLORIC ACID WEST OF EAST BUILDING
1	10P/10S	1317	RUSTED DRUMS CONTAINING OIL LOOKING NORTHWEST OUTSIDE EAST BUILDING
1	11P/11S	1318	CRATE LABEL, LOOKING WEST, OUTSIDE OF EAST BUILDING

100581

[illegible] 5/16/[illegible]

REFERENCE NO. 14

Uncontrolled Hazardous Waste Site Ranking System

A Users Manual
(HW-10)

Originally Published in
the July 16, 1982, *Federal Register*

United States
Environmental Protection
Agency

1984

100583

PERMEABILITY

TABLE 2

PERMEABILITY OF GEOLOGIC MATERIALS*

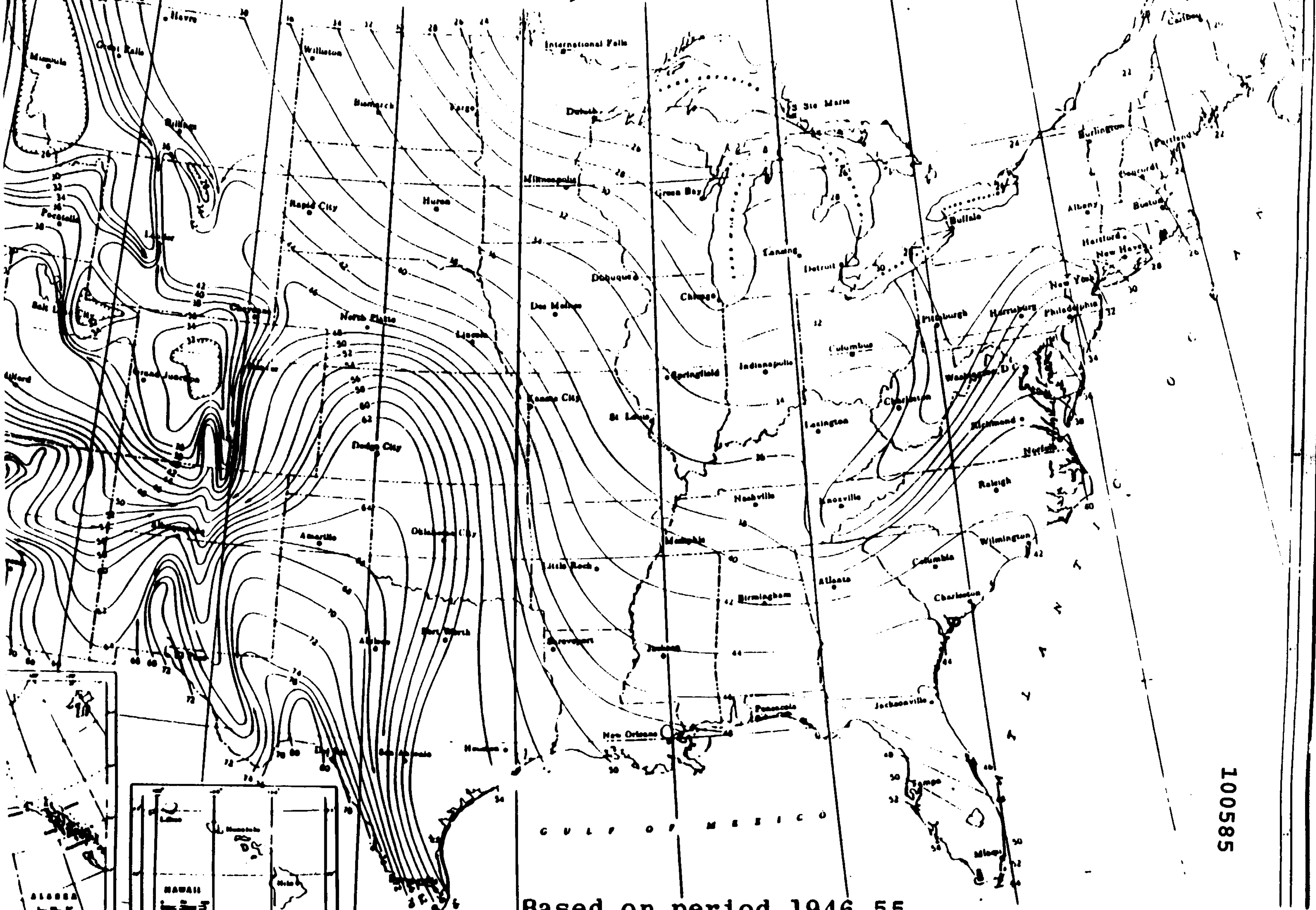
Type of Material	Approximate Range of Hydraulic Conductivity	Assigned Value
Clay, compact till, shale; unfractured metamorphic and igneous rocks	$<10^{-7}$ cm/sec	0
Silt, loess, silty clays, silty loams, clay loams; less permeable limestone, dolomites, and sandstone; moderately permeable till	10^{-5} - 10^{-7} cm/sec	1
Fine sand and silty sand; sandy loams; loamy sands; moderately permeable limestone, dolomites, and sandstone (no karst); moderately fractured igneous and metamorphic rocks, some coarse till	10^{-3} - 10^{-5} cm/sec	2
Gravel, sand; highly fractured igneous and metamorphic rocks; permeable basalt and lavas; karst limestone and dolomite	$>10^{-3}$ cm/sec	3

*Derived from:

Davis, S. N., Porosity and Permeability of Natural Materials in Flow-Through Porous Media, R.J.M. DeWest ed., Academic Press, New York, 1969

Freeze, R.A. and J.A. Cherry, Groundwater, Prentice-Hall, Inc., New York, 1979

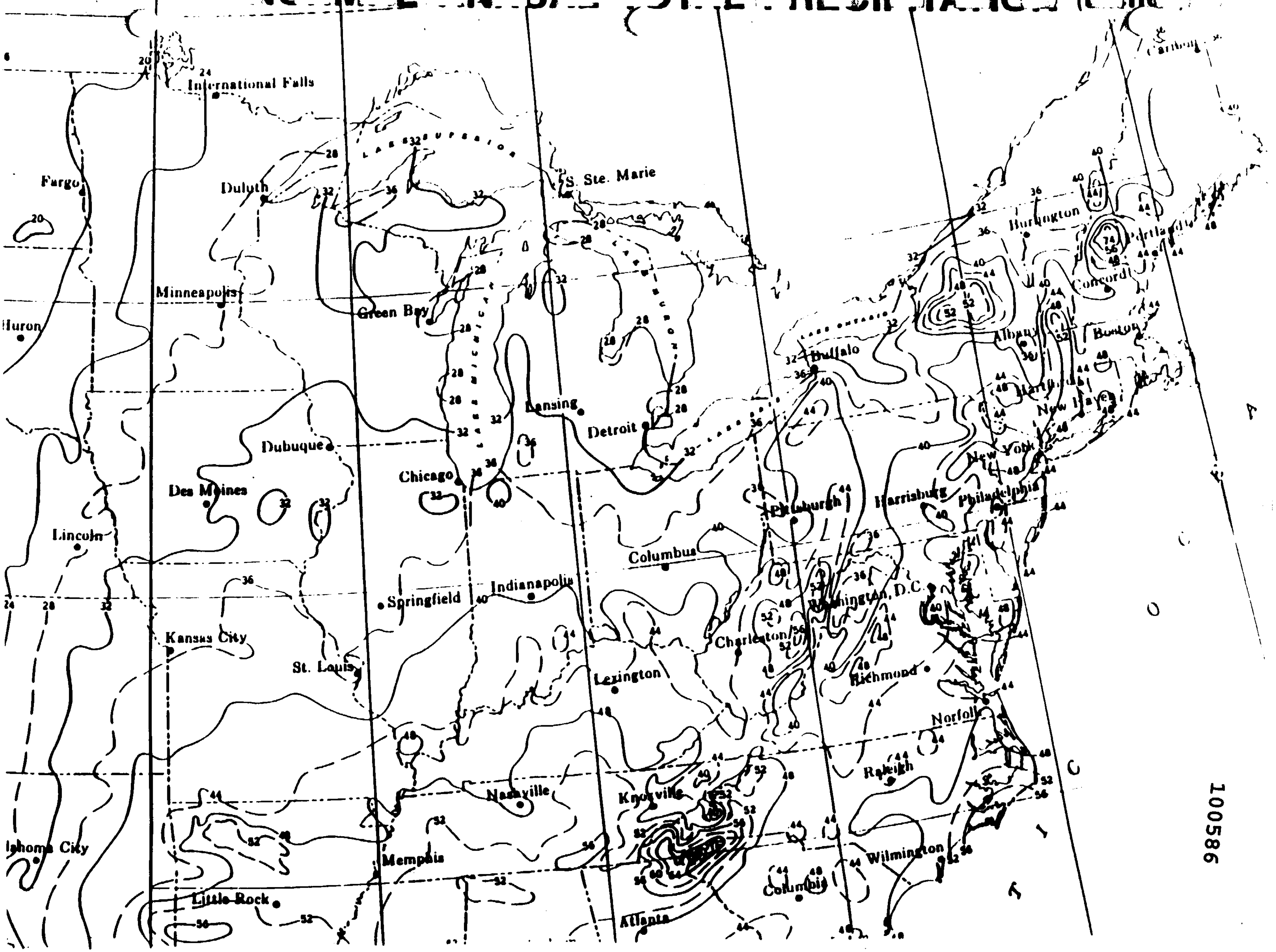
MEAN ANNUAL LAKE EVAPORATION
(In Inches)



Based on period 1946-55

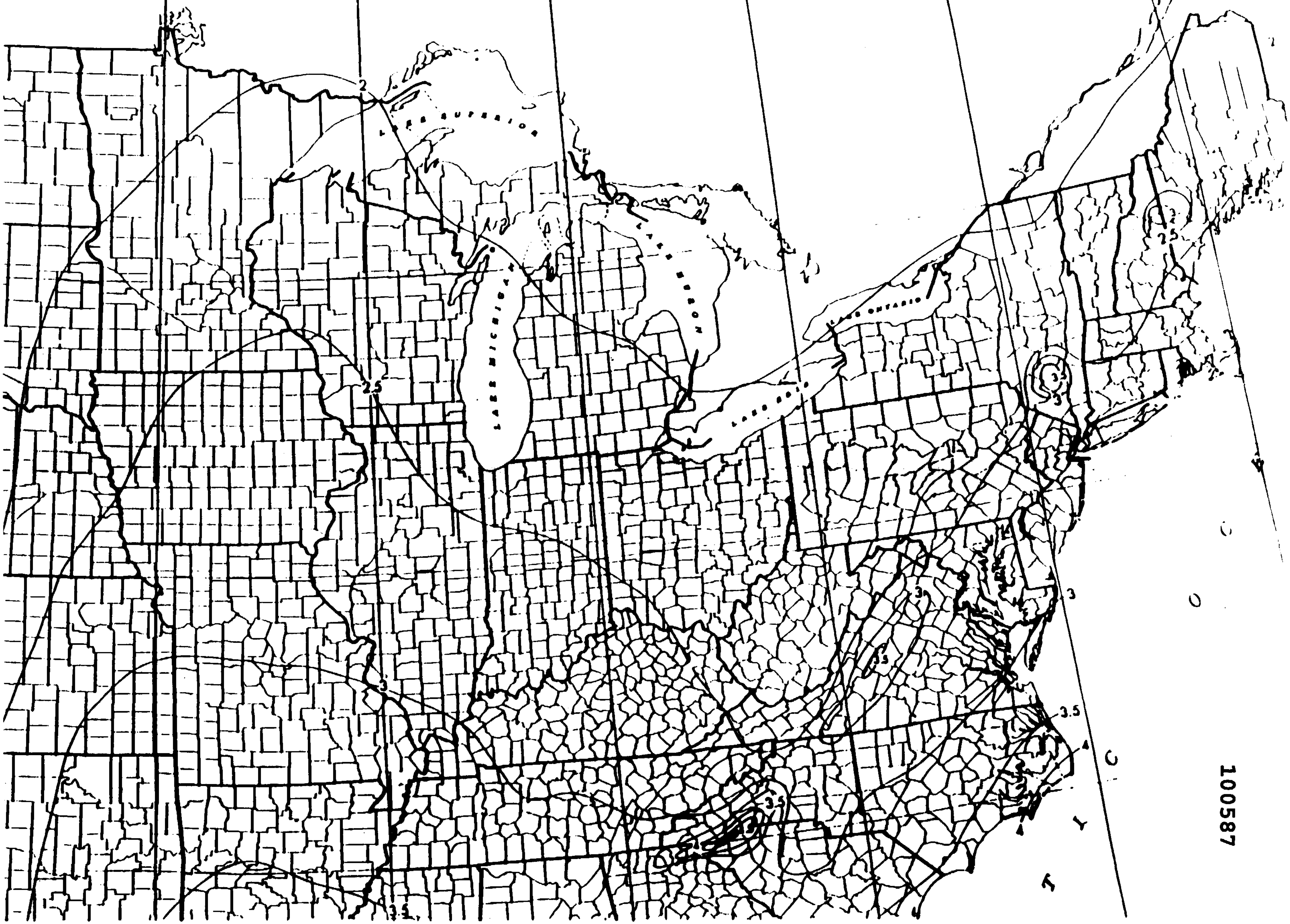
100585

NORMAL ANNUAL TOTAL PRECIPITATION (Inches)



100586

YEAR 24-HOUR RAINFALL (inches)



100587

REFERENCE NO. 15

NUS CORPORATION

TELECON NOTE

CONTROL NO: 02-8902-06

DATE: 3/23/89

TIME: 0940

DISTRIBUTION:

Denton Avenue Landfill

BETWEEN: Don Myott, P.E.

OF: NCDOH, Bureau of Public Water Supply

PHONE: (516) 535-2201

AND: Brian Dietz, NUS Corp.

DISCUSSION: (NUS)

call concerning the "on-site" monitoring wells and groundwater usage within 3-miles of the site:

Mr Myott informed me of the following:

* the DA monitoring wells are located on county property outside of the landfill and are owned by NCDOH. The wells have 4" (diameter) casings (PVC, with screens. They are not equipped with pumps and NCDOH sampled them with a 4" submersible pump. There are no locks on the wells but the proper wrench is needed to unscrew the caps. The wells can be sampled at any time but NCDOH should be contacted ahead of time (2-3 days prior). The wells were last sampled in Nov/Dec 1982 (the analyses of these samples are presented in the EA Phase I Report that is located in the "Denton Ave Landfill" site file).

* the public supply wells ~~supply the~~ BD are the major source drinking water for the people within 3 miles of the site. BD

* The number of private wells within 3 miles of the site is very small. The site is near the moraine and installing private wells can be very expensive. There may be some private industrial wells within 3 miles of the site. ~~however, all of the drinking water is supplied by public supply wells~~ BD

ACTION ITEMS:

* the "on-site" recharge basin recharges the upper glacial aquifer

* two supply wells located immediately east of the site are "restricted use" due to the presence of organics. They may not be available for

[illegible] because [illegible]

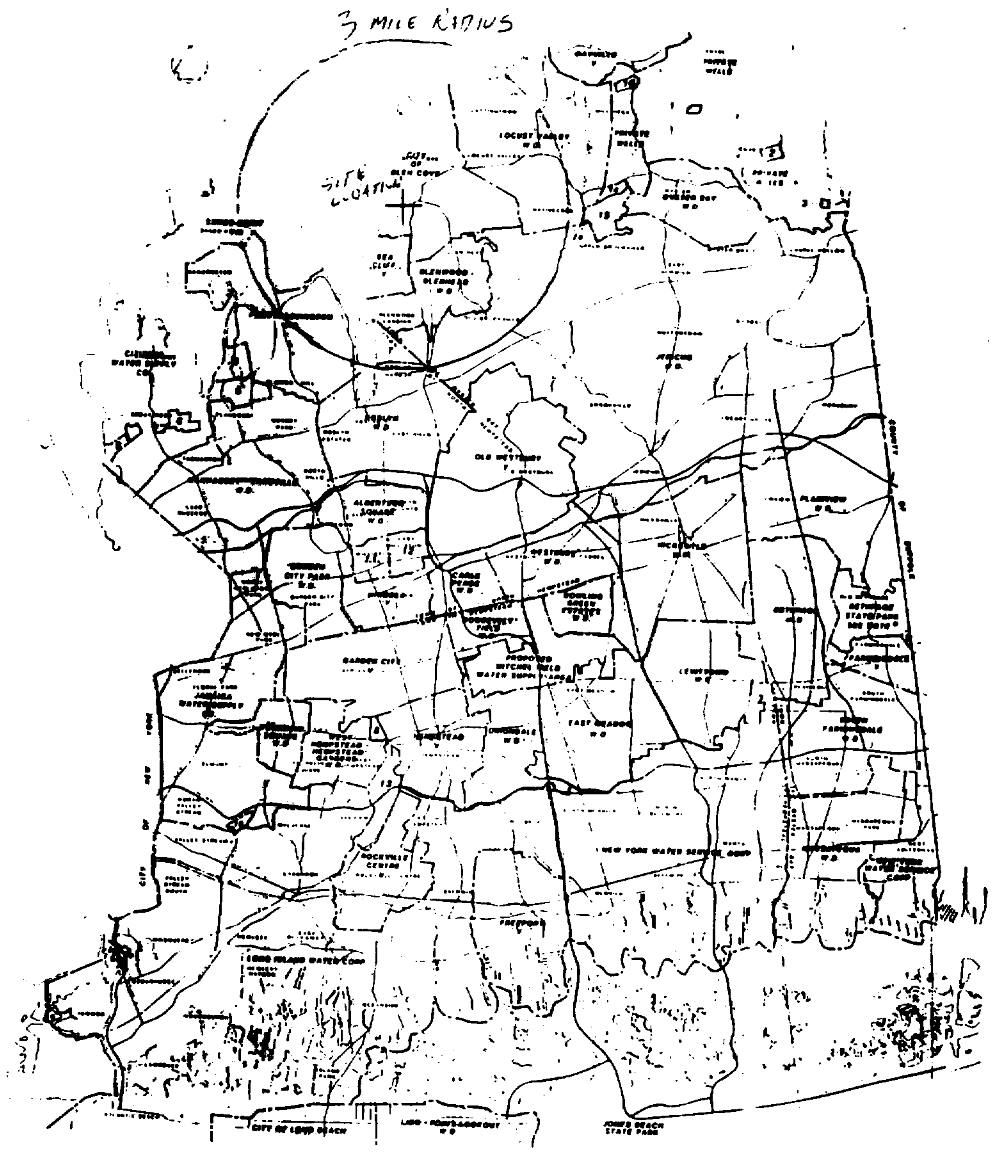
100589

Mr. Murott will be sending:

copies of Hagstrom maps that pinpoint the public supply wel[ls] within 3 miles of the site, as well as information regardi[ng] the districts and number of people served by each. He will also try to send a copy of a report and oversized map (generated by an NCDOH consultant in 1986) that pinpoints the public supply, private supply, and industrial wells wi[thin] Nassau County.

Brian Dietz
3/29/89

REFERENCE NO. 16



LEGEND

V. - VILLAGE

W.D. - WATER DISTRICT

W.S.D. - WATER SUPPLY DISTRICT

AREA IDENTIFICATION

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible] W.D.
5. [illegible] V.
6. [illegible] W.D.
7. [illegible] W.D.
8. GARDEN CITY [illegible] W.D.
9. [illegible] W.S.D.
10. [illegible]
11. [illegible] V.
12. [illegible] V.
13. [illegible] STATE PARK - SERVICED BY LONG ISLAND W.[illegible] AND ROCKVILLE CENTRE V
14. OYSTER BAY W.D
15. [illegible] - SERVICED BY PRIVATE WELLS
16. VALLEY STREAM STATE PARK - SERVICED BY LONG ISLAND WAT[illegible] AND JAMAICA WATER SUPPLY CO

*NOTE: BETHPAGE STATE PARK - SERVICED BY BETHPAGE W.D. AND [illegible] W.D.

NOTE: INFORMATION SHOWN ON THIS MAP HAS BEEN OBTAINED FROM THE OFFICE OF THE NASSAU COUNTY DEPARTMENTS OF [illegible] AND HEALTH

0.5" = 6400 FT.

WATER SUPPLY AND WATER DISTRICTS

THE NASSAU COUNTY [illegible]

100592

Table 5

WATER DISTRICTS AND WATER SUPPLY

THE FOLLOWING AREA AND POPULATION INFORMATION FOR WATER SERVICES IN NASSSAU COUNTY IS UTILIZED IN CONJUNCTION WITH PLATE 5

	Type of Service	Population 1980 U.S. Census	Population NCPC Estimate	Area (Acres)
TOWN OF HEMPSTEAD				
Bethpage***	W.D.		3,100	296
Bowling Green Estates	W.D.		9,700	887
East Meadow	W.D.		42,150	3,580
Franklin Square	W.D.		16,800	1,039
Freeport	V.	38,272		3,508
Garden City	V.	22,927		3,413
Garden City South	W.D.		1,050	87
Hempstead	V.	40,404		2,327
Hicksville***	W.D.		5,400	497
Jamaica Water Supply*	PVT.		73,650	5,166
Levittown	W.D.		41,950	3,112
Lido-Point Lookout	W.D.		4,500	1,476
Long Beach	CITY	34,073		1,590
Long Island Water Corp.	PVT.		238,950	27,054
New York Water Service Corp.	PVT.		126,650	12,496
Mineola*	V.	52		11
Rockville Centre	V.	25,405		2,196
Roosevelt Field	W.D.		100	858
Uniondale	W.D.		23,100	2,005
West Hempstead-Hempstead Gardens	W.D.		23,000	1,556
Mitchel Field Water Supply Area	(PROPOSED)		1,250	1,970
TOWN OF NORTH HEMPSTEAD				
Albertson Square	W.D.		11,650	1,453
Carle Place	W.D.		9,300	987
Citizens Water Supply Co.	PVT.		22,500	3,922
East Williston	V.	2,708		369
Garden City	V.	0		1
Garden City Park	W.D.		19,900	2,022
Glenwood	W.D.		350	282
Great Neck	W.D.		2,450	272
Jamaica Water Supply*	PVT.		18,150	1,140
Manhasset-Lakeville	W.D.		32,600	6,099
Mineola*	V.	20,705		1,186
Old Westbury***	V.	2,175		3,328
Plandome	V.	1,503		315
Port Washington	W.D.		27,150	4,220
Roslyn	W.D.		16,700	3,463
Sands Point	V.	2,742		2,743
Westbury	W.D.		19,750	2,151
Williston Park	V.	8,216		390
TOWN OF OYSTER BAY				
Bayville	V.	7,034		924
Bethpage**	W.D.		24,850	3,557
Farmingdale	V.	7,946		696
Glen Cove	CITY	24,618		4,336
Glenwood-Glenhead	W.D.		6,650	1,878
Hicksville**	W.D.		42,600	4,470
Jericho	W.D.		55,300	24,034
Locust Valley	W.D.		7,050	5,443
Massapequa	W.D.		44,950	4,028
New York Water Service Corp.	PVT.		17,600	2,229
Northeast Farmingdale	W.S.D.		400	59
Old Westbury*	V.	1,102		1,819
Oyster Bay	W.D.		6,300	2,358
Plainview	W.D.		32,700	5,190
Sea Cliff	V.	5,364		752
South Farmingdale	W.D.		43,300	3,817
DeForest Drive	P.W.A.		30	12
Mill Neck Estates	P.W.A.		250	60
SEL VRA	P.W.A.		80	60
Split Rock	P.W.A.		70	20

* Part in Town of North Hempstead
** Part in Town of Hempstead;
*** Part in Town of Oyster Bay
W.D. - Water District

W.S.D. - Water Supply District
V. - Village
PVT. - Private Company
P.W.A. - Private Water Association

Area Sources: Long Island Regional Planning Board, Existing Land Use, 1968; Nassau County Planning Commission planimeter estimates

Population Sources: 1980 U.S. Census and Nassau County Planning Commission estimates based on 1980 U. S. Census

REFERENCE NO. 17

GSC-TR8645

GRAPHICAL EXPOSURE MODELING SYSTEM

(GEMS)

USER'S GUIDE

VOLUME 2. MODELING

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF PESTICIDES AND TOXIC SUBSTANCES
EXPOSURE EVALUATION DIVISION
Task No. 3-2
Contract No. 68023970
Project Officer: Russell Kinerson
Task Manager: Loren Hall

Prepared by:

GENERAL SCIENCES CORPORATION
8401 Corporate Drive
Landover, Maryland 20785

Submitted: December 1, 1986

GEMS> I

L1 Tungsten
LATITUDE 40:51:42 LONGITUDE 73:38:17 1980 POPULATION

KM	0.00-.400	.400-.810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	SECTOR TOTALS
S 1	731	3631	5561	25505	12014	20416	67858
RING TOTALS	731	3631	5561	25505	12014	20416	67858

GEMS> I

L1 Tungsten
LATITUDE 40:51:42 LONGITUDE 73:38:17 1980 HOUSING

KM	0.00-.400	.400-.810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	SECTOR TOTALS
S 1	242	1287	2079	8472	4040	7079	23199
RING TOTALS	242	1287	2079	8472	4040	7079	23199

Distance (miles)	Population	Houses
0-1/4	731	242
0-1/2	4362	1529
0-1	9923	3608
0-2	35428	12080
0-3	47442	16120
0-4	67858	23199

REFERENCE NO. 18

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO:	DATE: 8/7/79	TIME: 16:40

DISTRIBUTION:

TO FILE - LI TUNGSTEN

07-8907-78

BETWEEN: JIM GILMORE	OF: NY DEC	PHONE: (516) 751-7900

AND:

STEVE OKULEWICZ, NUS CORP. EDISON

DISCUSSION:

ASKED MR. GILMORE ABOUT STATE WATER QUALITY CLASSIFICATION OF HEMPSTEAD HARBOR AND GLEN COVE CREEK. HE INFORMED ME THAT HEMPSTEAD HARBOR NORTH OF BAR BEACH IS CLASSIFIED AS SA - SUITABLE FOR SHELL FISHING FOR MARKET PURPOSES AND PRIMARY-SECONDARY CONTACT RECREATION. PRIMARY CONTACT RECREATION MEANS SWIMMING, SECONDARY CONTACT RECREATION MEANS FISHING. THE CLASSIFICATION FOR GLEN COVE CREEK FROM THE MOUTH TO PRATT'S POND IS CLASSIFIED AS CLASS I - SECONDARY CONTACT RECREATION EXCEPT FOR PRIMARY CONTACT RECREATION AND SHELL FISHING FOR MARKET PURPOSES.

ALSO, TO OBTAIN A COPY OF THE WATER QUALITY

~~ACTION ITEMS:~~

REGULATIONS FOR SURFACE AND GROUNDWATER TO CONTACT: PETER MACK - 518-457-3495, ASK FOR TITLE 6, CHAPTER 10, PART 700-705

100598

NUS 067 RE..SED 0685

REFERENCE NO. 19

NUS CORPORATION AND SUBSIDIARIES — **TELECON NOTE**

CONTROL NO:	DATE: 8/4/89	TIME: 1:30

DISTRIBUTION:

FILE - LI TUNGSTEN
C7-8907-78

BETWEEN:	OF:	PHONE:
PEARL ROTHBERG	JONES, DAY, REVIS & POGUE	(212) 326-3939

AND:

STEVE CHULEWICZ NUS EDISON

DISCUSSION:

CALLED HER ABOUT OWNERSHIP OF LI TUNGSTEN. SHE INFORMED ME THAT THE OWNERS ARE GLEN COVE DEVELOPMENT COMPANY - 34 MARKET PLACE, BALTIMORE MD. ANY CORRESPONDENCE SHOULD BE MAILED TO PEARL ROTHBERG - 599 LEXINGTON AVE NYC 10022.

ACTION ITEMS:

NUS 067 REVISED 0685

REFERENCE NO. 20

NUS CORPORATION AND SUBSIDIARIES		TELECON NOTE
CONTROL NO:	DATE: 8/8/89	TIME: 9:30

DISTRIBUTION:

TO FILE - L.I. TUNGSTEN

07-8907-78

BETWEEN:	OF:	PHONE:
JIM GILMORE	NY DEC	(516) 751-7900

AND:

STEVE OKULEWICZ, NUS CORP, EDISON N.J.

DISCUSSION:

I ASKED MR. GILMORE IF ANY WETLANDS EXISTED WITHIN 2 MILES OF THE SITE THAT WERE GREATER THAN 5 ACRES IN AREA. HE SAID WETLANDS EXISTED IN THE GARVIES POINT PRESERVE BUT WERE NOT 5 ACRES IN AREA, THEY ARE SMALLER. I ALSO ASKED ABOUT FEDERALLY ENDANGERED SPECIES IN THE AREA. HE TOLD ME THAT NO OFFICIAL ANNOUNCEMENT HAS BEEN MADE BUT ARE CONSIDERING THE PEREGRINE FALCON TO BE LISTED. HE IS NOT SURE IF NESTING AREAS HAVE BEEN FOUND WITHIN 2 MILES OF L.I. TUNGSTEN.

ACTION ITEMS:

100602

NUS 087 REVISED 0685

REFERENCE NO. 21

SUNY, Bldg. 40, Stony Brook, NY 11794-3070

September 28, 1987

Robert J. Mangan, P.E.
Director of Public Works
City Hall
Glen Cover, NY 11542

Dear Mr. Mangan:

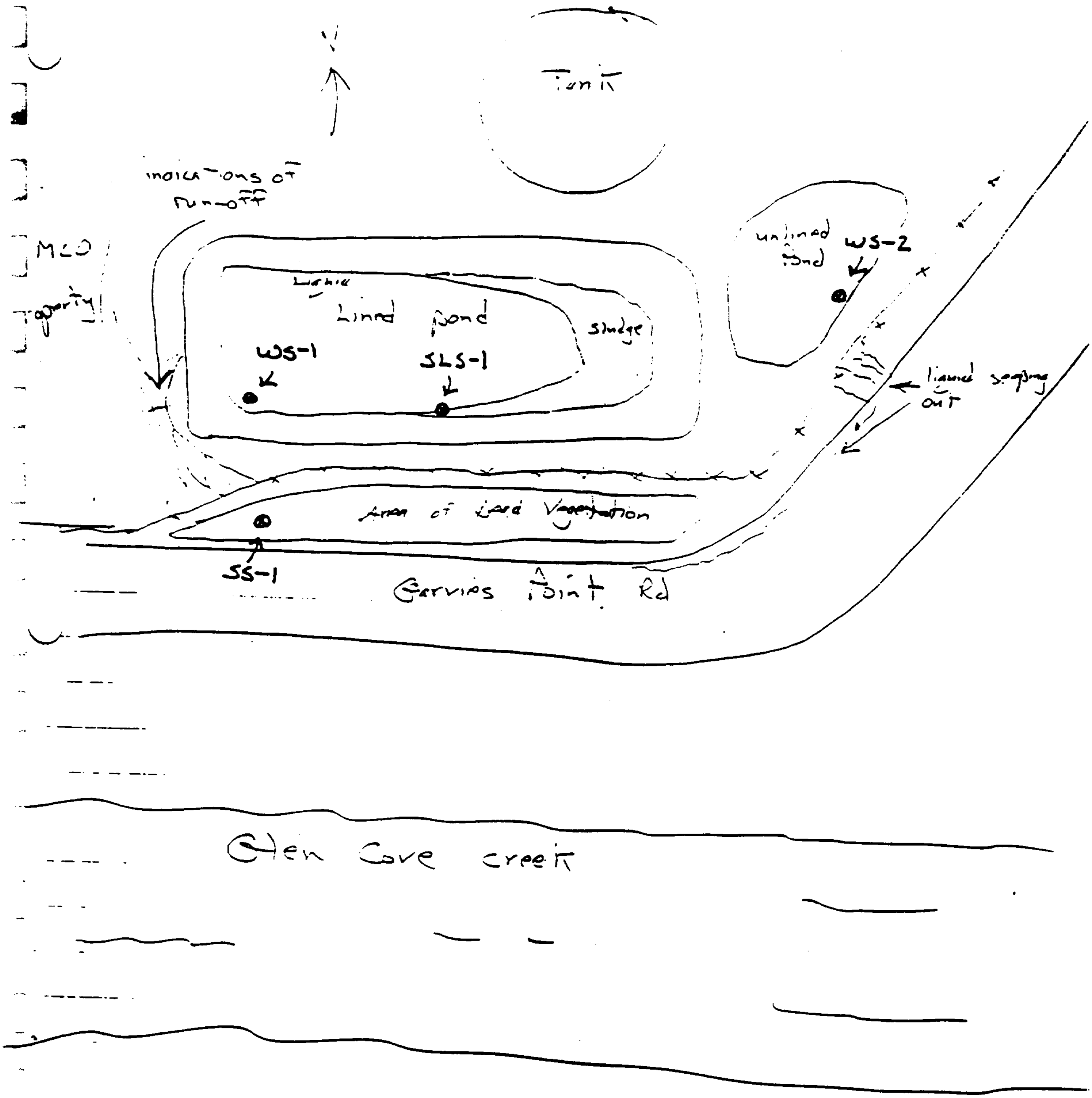
Some of the results are enclosed from the Li Tungsten site. These are the lined and unlined pond water tests, which we took on August 12, 1987.

The other results will follow soon. There was no heavy metal contamination found as shown here.

Sincerely,

Agnes Gara
Asst. Sanitary Engineer.

AG:cp
Enclosures



Tank
indications of run-off
MCO
unlined pond
WS-2
Lined pond
sludge
WS-1
SLS-1
liquid seeping out
Area of dead Vegetation
SS-1
Garvies Point Rd
Glen Cove creek

8-5-87 Li Tungsten Site Glen Cove

samples collected by J. Hofmann / Agnes Sara

200 SS-1 soil sample, grab, collected near discolored soil and dead vegetation

10 WS-1 water sample, grab, collected at south-west corner of lined pond

20 SLS-1 sludge sample, grab, collected south side of lined pond, just below surface of water-sludge interface

27 WS-2 Water sample, grab, collected at south side of unlined pond

0321

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

RESULTS OF EXAMINATION

FINAL REPORT

SAMPLE ID: 87109131 SAMPLE RECEIVED:87/08/12/11 CHARGE: 22.57
PROGRAM: 6301:DIV. SOLID & HAZARDOUS WASTE - DEC REGION 1
SOURCE ID: DRAINAGE BASIN:17 GAZETTEER CODE:2901
POLITICAL SUBDIVISION:GLEN COVE C. COUNTY:NASSAU
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: GT TUNGSTEN GARVIES PT RD GLEN COVE
DESCRIPTION:SS-1 WEST END OF DEAD VEGETATION S OF LINED POND
REPORTING LAB: 10:LABORATORY OF INORGANIC ANALYTICAL CHEMISTRY - ALBAN
TEST PATTERN: 10-035:METALS IN SOLID MATERIAL
SAMPLE TYPE: 000:SOIL, SAND
TIME OF SAMPLING: 87/08/06 14:00

DATE PRINTED:87/09/24

DATA REPORTED WITH UNITS OF MG/L OR MCG/L ARE ANALYTICAL VALUES OBTAINED ON THE EP-TOT LEACHATE.

PARAMETER	RESULT
SOLIDS, DRY	85. PERCENT
ARSENIC IN DRY SOLIDS	5700. MCG/G
MERCURY IN DRY SOLIDS	0.67 MCG/G
SELENIUM IN DRY SOLIDS	6.3 MCG/G
BERYLLIUM IN DRY SOLIDS	2.8 MCG/G
SILVER IN DRY SOLIDS	< 8. MCG/G
BARIUM IN DRY SOLIDS	63. MCG/G
CADMIUM IN DRY SOLIDS	104. MCG/G
COBALT IN DRY SOLIDS	34. MCG/G
CHROMIUM IN DRY SOLIDS	13.6 MCG/L
COPPER IN DRY SOLIDS	5320. MCG/G
MANGANESE IN DRY SOLIDS	112. MCG/G
NICKEL IN DRY SOLIDS	28.4 MCG/G
STRONTIUM IN DRY SOLIDS	79. MCG/G
TITANIUM IN DRY SOLIDS	166. MCG/G
VANADIUM IN DRY SOLIDS	13. MCG/G
ZINC IN DRY SOLIDS	6040. MCG/G
MOLYBDENUM IN DRY SOLIDS	886. MCG/L
ANTIMONY IN DRY SOLIDS	44. MCG/G
TIN IN DRY SOLIDS	< 40. MCG/G
THALLIUM IN DRY SOLIDS	< 16. MCG/L
ALUMINUM IN DRY SOLIDS	4980. MCG/G
DIGESTION OF SOLIDS FOR METALS	DONE
DIGESTION OF SOLIDS FOR HG	DONE

**** CONTINUED ON NEXT PAGE ****

COPIES SENT TO: CO(1), RO(3), LPHE(1), FED( ), INFO-P( ), INFO-L( )

N.Y.S. DEPT. OF ENVIRONMENTAL CONSERVATION
REGION 1 HEADQUARTERS
BUILDING 40, STATE UNIVERSITY OF N.Y.
STONY BROOK, N.Y. 11790

SUBMITTED BY:HOFMANN

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

RESULTS OF EXAMINATION

FINAL REPORT

SAMPLE ID: 871009131 SAMPLE RECEIVED:87/08/12/11 CHARGE: 22.57
POLITICAL SUBDIVISION:GLEN COVE C.
LOCATION: LI TUNGSTEN CARVIES PT RD GLEN COVE COUNTY:NASSAU
TIME OF SAMPLING: 87/08/06 14:00

DATE PRINTED:87/09/24

FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

-----------PARAMETER-----------	-----------RESULT-----------
TUNGSTEN IN DRY SOLIDS	< 5000. MCG/L
PREP OF SAMPLE FOR EP TOX	DONE

ANALYSIS: ICP-1 ICP GROUPING 1

-----------PARAMETER-----------	-----------RESULT-----------
MERCURY	< 0.2 MCG/L
ARSENIC	180. MCG/L
SELENIUM	< 5. MCG/L
LEAD	4600. MCG/L
BERYLLIUM	< 1. MCG/L
SILVER	24. MCG/L
BARIUM	46. MCG/L
CADMIUM	59. MCG/L
COBALT	55. MCG/L
CHROMIUM	12. MCG/L
COPPER	2700. MCG/L
IRON	5850. MCG/L
MANGANESE	127. MCG/L
NICKEL	37. MCG/L
STRONTIUM	93. MCG/L
TITANIUM	< 5. MCG/L
VANADIUM	< 5. MCG/L
ZINC	1930. MCG/L
MOLYBDENUM	60. MCG/L
ANTIMONY	98. MCG/L
TIN	< 50. MCG/L
THALLIUM	< 20. MCG/L
ALUMINUM	4950. MCG/L

FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

-----------PARAMETER-----------	-----------RESULT-----------
LEAD IN DRY SOLIDS	37600. MCG/G

FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

-----------PARAMETER-----------	-----------RESULT-----------
IRON IN DRY SOLIDS	74000. MCG/G

**** END OF REPORT ****

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 1

RESULTS OF EXAMINATION

FINAL REPORT

SAMPLE ID: 871006658 SAMPLE RECEIVED:87/08/12/11 CHARGE: +.89
PROGRAM: 6301:DIV. SOLID & HAZARDOUS WASTE - DEC REGION 1
SOURCE ID: DRAINAGE BASIN:17 GAZETTEER CODE:2901
POLITICAL SUBDIVISION:GLEN COVE C. COUNTY:NASSAU
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: LI TUNGSTEN GARVIES PT RD GLEN COVE
DESCRIPTION:WS-1 SOUTHWEST CORNER LINED POND
REPORTING LAB: 10:LABORATORY OF INORGANIC ANALYTICAL CHEMISTRY - ALBANY
TEST PATTERN: 10-158:COMPLETE METAL SCAN - TOTAL RECOVERABLE
SAMPLE TYPE: 340:INDUSTRIAL WASTE, UNCHLORINATED
TIME OF SAMPLING: 87/08/06 14:10 DATE PRINTED:87/09/22

ANALYSIS: ICP-6 ICP GROUPING 6 - COMPLETE SCAN, TOTAL RECOVERABLE

PARAMETER	RESULT
MERCURY	0.3 MCG/L
ARSENIC, TOTAL RECOVERABLE	51. MCG/L
SELENIUM, TOTAL RECOVERABLE	< 5.0 MCG/L
BERYLLIUM, TOTAL RECOVERABLE	< 1. MCG/L
SILVER, TOTAL RECOVERABLE	14. MCG/L
BARIUM, TOTAL RECOVERABLE	76. MCG/L
CADMIUM, TOTAL RECOVERABLE	< 5. MCG/L
COBALT, TOTAL RECOVERABLE	605. MCG/L
CHROMIUM, TOTAL RECOVERABLE	6. MCG/L
COPPER, TOTAL RECOVERABLE	850. MCG/L
IRON, TOTAL RECOVERABLE	3,200. MCG/L
MANGANESE, TOTAL RECOVERABLE	832. MCG/L
NICKEL, TOTAL RECOVERABLE	201. MCG/L
STRONTIUM, TOTAL RECOVERABLE	115. MCG/L
TITANIUM, TOTAL RECOVERABLE	49. MCG/L
VANADIUM, TOTAL RECOVERABLE	7. MCG/L
ZINC, TOTAL RECOVERABLE	246. MG/L
LEAD, TOTAL RECOVERABLE	60. MCG/L
ANTIMONY, TOTAL RECOVERABLE	105. MCG/L
TIN, TOTAL RECOVERABLE	< 50. MCG/L
THALLIUM, TOTAL RECOVERABLE	< 20. MCG/L
ALUMINUM, TOTAL RECOVERABLE	1070. MCG/L

FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

PARAMETER	RESULT
MOLYBDENUM, TOTAL RECOVERABLE	1.5 MG/L
TUNGSTEN, TOTAL RECOVERABLE	< 50. MG/L

**** END OF REPORT ****

COPIES SENT TO: CO(1), RO(3), LPHE(1), FED( ), INFO-P( ), INFO-L( )

N.Y.S.DEPT.OF ENVIRONMENTAL CONSERVATION
REGION 1 HEADQUARTERS
BUILDING 40,STATE UNIVERSITY OF N.Y.
STONY BROOK,N.Y. 11790

SUBMITTED BY:HOFMANN

100609

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

RESULTS OF EXAMINATION — FINAL REPORT

SAMPLE ID: 871009130 — SAMPLE RECEIVED:87/08/12/11 — CHARGE: 22.57
PROGRAM: 6301:DIV. SOLID & HAZARDOUS WASTE - DEC REGION 1
SOURCE ID: — DRAINAGE BASIN:17 — GAZETTEER CODE:2901
POLITICAL SUBDIVISION:GLEN COVE C. — COUNTY:NASSAU
LATITUDE: . — LONGITUDE: . — Z DIRECTION:
LOCATION: LI TUNGSTEN GARVIES PT RD GLEN COVE
DESCRIPTION:SLS-1 SOUTH SIDE OF LINED PD MIDDLE
REPORTING LAB: 10:LABORATORY OF INORGANIC ANALYTICAL CHEMISTRY - ALBANY
TEST PATTERN: 10-035:METALS IN SOLID MATERIAL
SAMPLE TYPE: 620:WET SLUDGE
TIME OF SAMPLING: 87/08/06 14:20 — DATE PRINTED:87/09/24

DATA REPORTED WITH UNITS OF MG/L OR MCG/L ARE ANALYTICAL VALVES OBTAINED ON THE EP-TOT LEACHATE.

PARAMETER	RESULT
SOLIDS, DRY	23. PERCENT
ARSENIC IN DRY SOLIDS	1200. MCG/G
MERCURY IN DRY SOLIDS	1.4 MCG/G
SELENIUM IN DRY SOLIDS	0.5 MCG/G
BERYLLIUM IN DRY SOLIDS	116. MCG/G
SILVER IN DRY SOLIDS	< 8. MCG/G
BARIUM IN DRY SOLIDS	364. MCG/G
CADMIUM IN DRY SOLIDS	17.4 MCG/G
COBALT IN DRY SOLIDS	3240. MCG/G
CHROMIUM IN DRY SOLIDS	218. MCG/L
COPPER IN DRY SOLIDS	3820. MCG/G
MANGANESE IN DRY SOLIDS	8400. MCG/G
NICKEL IN DRY SOLIDS	896. MCG/G
STRONTIUM IN DRY SOLIDS	73. MCG/G
TITANIUM IN DRY SOLIDS	186. MCG/G
VANADIUM IN DRY SOLIDS	340. MCG/G
ZINC IN DRY SOLIDS	3280. MCG/G
MOLYBDENUM IN DRY SOLIDS	5960. MCG/L
ANTIMONY IN DRY SOLIDS	400. MCG/G
TIN IN DRY SOLIDS	800. MCG/G
THALLIUM IN DRY SOLIDS	< 16. MCG/L
ALUMINUM IN DRY SOLIDS	22600. MCG/G
DIGESTION OF SOLIDS FOR METALS	DONE
DIGESTION OF SOLIDS FOR HG	DONE

**** CONTINUED ON NEXT PAGE ****

COPIES SENT TO: CO(1), RO(3), LPHE(1), FED( ), INFO-P( ), INFO-L( )

N.Y.S.DEPT.OF ENVIRONMENTAL CONSERVATION
REGION 1 HEADQUARTERS
BUILDING 40,STATE UNIVERSITY OF N.Y.
STONY BROOK,N.Y. 11790

SUBMITTED BY:HOFMANN

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

RESULTS OF EXAMINATION

FINAL REPORT

SAMPLE ID: 871009130 SAMPLE RECEIVED:87/08/12/11 CHARGE: 22.57
POLITICAL SUBDIVISION:GLEN COVE C. COUNTY:NASSAU
LOCATION: LI TUNGSTEN CARBIDES PI RD GLEN COVE
TIME OF SAMPLING: 87/08/06 14:20 DATE PRINTED:87/09/24

FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

-----------PARAMETER-----------	-----------RESULT-----------
TUNGSTEN IN DRY SOLIDS	< 5000. MCG/L
PREP OF SAMPLE FOR EP TOX	DONE

ANALYSIS: ICP-1 ICP GROUPING 1

-----------PARAMETER-----------	-----------RESULT-----------
MERCURY	< 0.2 MCG/L
ARSENIC	< 10. MCG/L
SELENIUM	< 5. MCG/L
LEAD	32. MCG/L
BERYLLIUM	123. MCG/L
SILVER	14. MCG/L
BARIUM	368. MCG/L
CADMIUM	56. MCG/L
COBALT	6600. MCG/L
CHROMIUM	5. MCG/L
COPPER	134. MCG/L
IRON	< 10. MCG/L
MANGANESE	14400. MCG/L
NICKEL	1690. MCG/L
STRONTIUM	3780. MCG/L
TITANIUM	< 5. MCG/L
VANADIUM	< 5. MCG/L
ZINC	5640. MCG/L
MOLYBDENUM	31. MCG/L
ANTIMONY	< 50. MCG/L
TIN	< 50. MCG/L
THALLIUM	37. MCG/L
ALUMINUM	9680. MCG/L

FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

-----------PARAMETER-----------	-----------RESULT-----------
LEAD IN DRY SOLIDS	17800. MCG/G

FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

-----------PARAMETER-----------	-----------RESULT-----------
IRON IN DRY SOLIDS	129000. MCG/G

**** END OF REPORT ****

Ref. N. Vincoleone
518-474-0576

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

E 1

RESULTS OF EXAMINATION

FINAL REPORT

SAMPLE ID: 871006657
PROGRAM: 6301:DIV. SOLID & HAZARDOUS WASTE - DEC REGION 1
SAMPLE RECEIVED:87/08/12/11 CHARGE: 4.89
SOURCE ID:
POLITICAL SUBDIVISION:GLEN COVE C.
DRAINAGE BASIN:17 GAZETTEER CODE:2901
LATITUDE: . LONGITUDE: . COUNTY:NASSAU
LOCATION: LI-TUNGSTEN GARVIES PT RD GLEN COVE Z DIRECTION:
DESCRIPTION:WS-2 SOUTH SIDE OF UNLINED POND
REPORTING LAB: 10:LABORATORY OF INORGANIC ANALYTICAL CHEMISTRY - ALBANY
TEST PATTERN: 10-159:COMPLETE METAL SCAN - TOTAL RECOVERABLE
SAMPLE TYPE: 340:INDUSTRIAL WASTE, UNCHLORINATED
TIME OF SAMPLING: 87/08/06 14:27
DATE PRINTED:87/09/22

ANALYSIS: ICP-6 ICP GROUPING 6 - COMPLETE SCAN, TOTAL RECOVERABLE

----------PARAMETER----------	----------RESULT----------
MERCURY	< 0.2 MCG/L
ARSENIC, TOTAL RECOVERABLE	34. MCG/L
SELENIUM, TOTAL RECOVERABLE	< 5.0 MCG/L
BERYLLIUM, TOTAL RECOVERABLE	< 1. MCG/L
SILVER, TOTAL RECOVERABLE	< 10. MCG/L
BARIUM, TOTAL RECOVERABLE	240. MCG/L
CADMIUM, TOTAL RECOVERABLE	< 5. MCG/L
COBALT, TOTAL RECOVERABLE	600. MCG/L
CHROMIUM, TOTAL RECOVERABLE	20. MCG/L
COPPER, TOTAL RECOVERABLE	170. MCG/L
IRON, TOTAL RECOVERABLE	1690. MCG/L
MANGANESE, TOTAL RECOVERABLE	400. MCG/L
NICKEL, TOTAL RECOVERABLE	90. MCG/L
STRONTIUM, TOTAL RECOVERABLE	3670 MCG/L
TITANIUM, TOTAL RECOVERABLE	< 5. MCG/L
VANADIUM, TOTAL RECOVERABLE	10. MCG/L
ZINC, TOTAL RECOVERABLE	140. MG/L
LEAD, TOTAL RECOVERABLE	430. MCG/L
ANTIMONY, TOTAL RECOVERABLE	< 50. MCG/L
TIN, TOTAL RECOVERABLE	< 50. MCG/L
THALLIUM, TOTAL RECOVERABLE	< 20. MCG/L
ALUMINUM, TOTAL RECOVERABLE	450. MCG/L

FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

----------PARAMETER----------	----------RESULT----------
MOLYBDENUM, TOTAL RECOVERABLE	1.7 MG/L
TUNGSTEN, TOTAL RECOVERABLE	< 50. MG/L

**** END OF REPORT ****

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N.Y.S.DEPT.OF ENVIRONMENTAL CONSERVATION
REGION I HEADQUARTERS
BUILDING 40,STATE UNIVERSITY OF N.Y.
STONY BROOK,N.Y. 11790

SUBMITTED BY:HOFMANN

100612

REFERENCE NO. 22

New York State Department of Environmental Conservation

MEMORANDUM

TO: Li Tungsten File
FROM: ~~R. Becherer~~
SUBJECT: Analytical Data

DATE: July 15, 1986

The following data has been collected at the Li Tungsten site. (See attached map)

AREA

1. This sample was collected from six of the drums in the main processing area.

3. These samples were taken from the lined basin just north of Garvies Point Road.

4. These three samples were collected from three disposal sites in area four. There is a northern, middle and southern runoff area..

004 This data is from one of the facility's wastewater discharges.

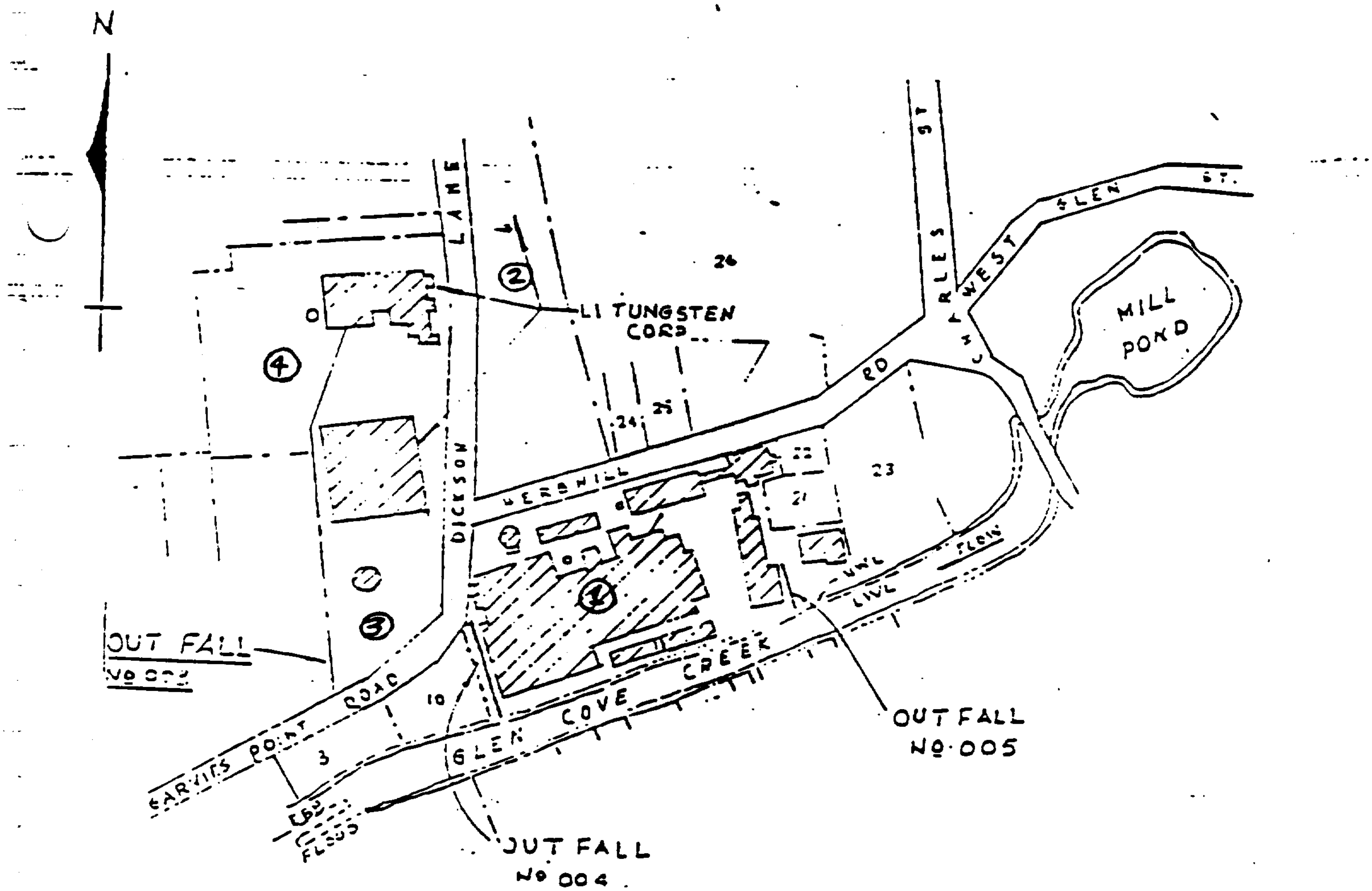
RB:11

Attachment

Robert A Becherer

cc: G. Brezner
T. Candela

100614


N
LI TUNGSTEN CORP
OUT FALL No 003
OUT FALL No 005
OUT FALL No 004
MILL POND
GLEN ST.
CHARLES ST
DICKSON LANE
HERBHILL RD
GARVIES POINT ROAD
GLEN COVE CREEK
FLOW

100615

NASSAU COUNTY DEPARTMENT OF HEALTH
DIVISION OF LABORATORIES AND RESEARCH
ENVIRONMENTAL HEALTH LABORATORIES

TRACE ORGANICS

Access Number: 503335
Source: LI TUNGSTEN, 63 HERB HILL RD., GLEN COVE
Matrix: WATER
Site: OUTFALL 004
Date Sampled: 11/27/85
Date of Report: 12/04/85

VOLATILE HALOGENATED	MRC (ug/l)	RESULT (ug/l)
TRICHLOROFLUOROMETHANE	NA	NA
METHYLENE CHLORIDE 1,1,2-TRICHLOROTRIFLUOROETHANE 1,1-DICHLOROETHYLENE	6	11
c & t-1,2-DICHLOROETHYLENE	11	NA
1,1-DICHLOROETHANE	NA	NA
CHLOROFORM	1	[illegible]
1,1,1-TRICHLOROETHANE	1	[illegible]
CARBON TETRACHLORIDE	1	[illegible]
TRICHLOROETHYLENE	1	[illegible]
BROMODICHLOROMETHANE	1	[illegible]
c-1,3-DICHLOROPROPENE DIBROMOCHLOROMETHANE	1	[illegible]
1,1,2-TRICHLOROETHANE	1	[illegible]
1,2-DIBROMOETHANE	1	[illegible]
TETRACHLOROETHYLENE	1	[illegible]
BROMOFORM	2	[illegible]

VOLATILE AROMATICS	MRC (ug/l)	RESULT (ug/l)
BENZENE	2	NA
TOLUENE	4	NA
CHLOROBENZENE	2	NA
ETHYLBENZENE	3	NA
XYLENE (o,m,p)	6	NA
DICHLOROBENZENE (o,m,p)	11	NA

MRC - MINIMUM REPORTABLE CONCENTRATION NA - NOT ANALYZED
NR - NO RESULT DUE TO TECHNICAL REASONS - RESAMPLE SUGGESTED
PPB: AIR - nl/l WATER - ug/l SOIL - ng/g

DEC 0 5 1985

100616

ABORATORY REPORT
CHEMICAL EXAMINATION OF INDUSTRIAL AND HAZARDOUS WASTES
Division of Laboratories and Research
Na County Department of Health

1 ☐ Routine
2 ☐ Resample
3 ☑ Special
4 ☐ Complaint
5 ☐ Other

Lab. No. 13652

Field No. VN196

Source Information (Please Print)

Premises: Li Tungsten
Address: 63 Herb Hill Rd.
Town: Glen Cove
Collection Point: composite of sludge from 6 drums on Li property

Sampler's Comments:
- claylike; dk brown color
- EP Toxicity

	Month	Day	Year
Date Collected	12	13	85
Date Received	DEC	13	985
Date Reported			8

Collection Time: 11 : am
Collected By: U. Nisky

Bureau:
1 ☑ Land Resources Management
9 ☐ Other (specify)

Sample Type:
A ☐ Water
B ☑ Soil
C ☐ Sludge
D ☐ Waste Solvent
E ☐ Oil
F ☐ Other

CHEMICAL EXAMINATION

Check	Metals		Result	Check	Non-Metals		Result
1	Aluminum	mg/l	25.0	15	Chloride	mg/l	
2	Arsenic	mg/l	<0.005	16	Cyanide	mg/l	
3	Barium	mg/l	<0.5	17	Fluoride	mg/l	
4	Cadmium	mg/l	0.33	18	MBAS	mg/l	
5	Chromium, Total	mg/l	<0.01	19	pH INITIAL		10.3
6	Copper	mg/l	34.5	20	Phenols	mg/l	
7	Iron, Total	mg/l	0.41	21	Solids, Suspended	mg/l	
8	Lead	mg/l	0.04	22	Solids, Total Diss.	mg/l	
9	Manganese	mg/l	20.0	23	Sulfate	mg/l	
10	Mercury	mg/l		24	Ammonia nitrogen	mg/l	
11	Nickel	mg/l	32.0	25	Kjeldahl nitrogen	mg/l	
12	Selenium	mg/l	<0.005	26	Nitrite nitrogen	mg/l	
13	Silver	mg/l		27	Nitrate nitrogen	mg/l	
14	Zinc	mg/l	21.5	28	Total Phos.	mg/l	

SPECIAL ANALYSIS

Check	Constituent		Result
29	Chromium hex.	mg/l	
30	FINAL pH		5.5
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			

Examiner's Comments --

100617

LABORATORY REPORT
CHEMICAL EXAMINATION OF INDUSTRIAL AND HAZARDOUS WASTES
Division of Laboratories and Research
County Department of Health

1 ☐ Routine
2 ☐ Resample
3 ☑ Special
4 ☐ Complaint
5 ☐ Other

Lab. No. 13651
Field No. UN-195

Source Information (Please Print)

Premises	Li Tungsten		Month / Day / Year	
Address	63 Herb Hill Rd	Date Collected	12 / 13 / 85	
Town	Glen Cove	Date Received	DEC 13 1985	
Collection Point	composite of recharge basin soil across street from Li; on Garvies Pt. Rd.	Date Reported		
		Collection Time	10:50 am	
		Collected By:	V. Nigro	

Sampler's Comments:
- sample orange
- EP Toxicity

Bureau:
1 ☑ Land Resources Management
9 ☐ Other (specify)

Sample Type:
A ☐ Water
B ☑ Soil
C ☐ Sludge
D ☐ Waste Solvent
E ☐ Oil
F ☐ Other

CHEMICAL EXAMINATION

Check	Metals		Result	Check	Non-Metals		Result
1	Aluminum	mg/l	25.0	15	Chloride	mg/l	
2	Arsenic	mg/l	0.015	16	Cyanide	mg/l	
3	Barium	mg/l	<0.5	17	Fluoride	mg/l	
4	Cadmium	mg/l	0.094	18	MBAS	mg/l	
5	Chromium, Total	mg/l	0.02	19	pH initial		9.5
6	Copper	mg/l	4.45	20	Phenols	mg/l	
7	Iron, Total	mg/l	0.10	21	Solids, Suspended	mg/l	
8	Lead	mg/l	0.08	22	Solids, Total Diss.	mg/l	
9	Manganese	mg/l	13.3	23	Sulfate	mg/l	
10	Mercury	mg/l		24	Ammonia nitrogen	mg/l	
11	Nickel	mg/l	6.75	25	Kjeldahl nitrogen	mg/l	
12	Selenium	mg/l	<0.005	26	Nitrite nitrogen	mg/l	
13	Silver	mg/l		27	Nitrate nitrogen	mg/l	
14	Zinc	mg/l	10.5	28	Total Phos.	mg/l	

SPECIAL ANALYSIS

Check	Constituent		Result
29	Chromium hex.	mg/l	
30	Final pH		5.6
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			

Examiner's Comments

100618

CHEMICAL EXAMINATION OF INDUSTRIAL AND HAZARDOUS WASTES

Division of Laboratories and Research

Nassau County Department of Health

1 Routine
2 ☐ Resample
3 ☐ Special
4 ☐ Complaint
5 ☐ Other

Lab. No. 24

Field No. VN-180

Source Information (Please Print)

Premises	G. Tungsten	Date Collected	10
Address	63 Herb Hill Rd	Date Received	10/7/85
Town	Glen Cove	Date Reported	
Collection Point	catch basin / lagoon. soil sample	Collection Time	10:00a
		Collected By:	V. Nisco

Sampler's Comments:

- Extraction procedure, please
- DEC sample taken during hurricane

Bureau:
1 ☑ Land Resources Management
9 ☐ Other (specify)

Sample Type:
A ☐ Water
B ☑ Soil
C ☐ Sludge
D ☐ Waste Solv
E ☐ Oil
F ☐ Other

CHEMICAL EXAMINATION

Check	Metals		Result	Check	Non-Metals		Result
1	Aluminum	mg/l	3.0	15	Chloride	mg/l	
	Arsenic	mg/l	0.037	16	Cyanide	mg/l	
3	Barium	mg/l	<0.5	17	Fluoride	mg/l	
4	Cadmium	mg/l	0.063	18	MBAS	mg/l	
5	Chromium, Total	mg/l	<0.01	19	pH INITIAL		3.5
6	Copper	mg/l	4.10	20	Phenols	mg/l	
7	Iron, Total	mg/l	10.50	21	Solids, Suspended	mg/l	
8	Lead	mg/l	0.78	22	Solids, Total Diss.	mg/l	
9	Manganese	mg/l	0.27	23	Sulfate	mg/l	
10	Mercury	mg/l	INTERFERENCE	24	Ammonia nitrogen	mg/l	
11	Nickel	mg/l	0.10	25	Kjeldahl nitrogen	mg/l	
12	Selenium	mg/l	<0.005	26	Nitrite nitrogen	mg/l	
13	Silver	mg/l	<0.05	27	Nitrate nitrogen	mg/l	
14	Zinc	mg/l	0.72	28	Total Phos.	mg/l	

SPECIAL ANALYSIS

Check	Constituent		R
29	Chromium hex.	mg/l	
30	Final pH		3
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			

Examiner's Comments

100619

:ORATORY REPORT
:MICAL EXAMINATION OF INDUSTRIAL
D HAZARDOUS WASTES
sion of Laboratories and Research
ounty Department of Health

1 ☑ Routine
2 ☐ Resample
3 ☐ Special
4 ☐ Complaint
5 ☐ Other

Lab. No. 1914 [redacted]

Field No. VIV-74

ce Information (Please Print)

mises Li Tungsten

ess [illegible] Rd

n [illegible]

ection Point across [illegible] Tungsten
northernmost pile of soil - access - Tuint (t.

pler's Comments:
- EP Toxicity
- Li property

	Month	Day	Year
Date Collected	4	4	86
Date Received			8
Date Reported			8

Collection Time 1:15 PM

Collected By: V. [illegible]

Bureau:
1 ☑ Land Resources Management
9 ☐ Other (specify)

Sample Type:
A ☐ Water
B ☑ Soil
C ☐ Sludge
D ☐ Waste Solvent
E ☐ Oil
F ☐ Other

CHEMICAL EXAMINATION

Metals		Result	Check	Non-Metals		Result
Aluminum	mg/l	<0.5	15	Chloride	mg/l	
Arsenic	mg/l	0.033	16	Cyanide	mg/l	
Barium	mg/l	<0.5	17	Fluoride	mg/l	
Cadmium	mg/l	<0.001	18	MBAS	mg/l	
Chromium, Total	mg/l	<0.01	19	pH initial		3.8
Copper	mg/l	0.17	20	Phenols	mg/l	
Iron, Total	mg/l	0.64	21	Solids, Suspended	mg/l	
Lead	mg/l	0.04	22	Solids, Total Diss.	mg/l	
Manganese	mg/l	0.16	23	Sulfate	mg/l	
Mercury	mg/l	<0.0005	24	Ammonia nitrogen	mg/l	
Nickel	mg/l	<0.05	25	Kjeldahl nitrogen	mg/l	
Selenium	mg/l	<0.005	26	Nitrite nitrogen	mg/l	
Silver	mg/l	<0.05	27	Nitrate nitrogen	mg/l	
Zinc	mg/l	0.12	28	Total Phos.	mg/l	

SPECIAL ANALYSIS

Check	Constituent		Result
29	Chromium hex.	mg/l	
30	final pH		3.1
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			

er's Comments

MAY 16 1986

100620

LABORATORY REPORT
CHEMICAL EXAMINATION OF INDUSTRIAL AND HAZARDOUS WASTES
Division of Laboratories and Research
County Department of Health

1 ☑ Routine	Lab. No. 1915
2 ☐ Resample	
3 ☐ Special	
4 ☐ Complaint	Field No. 11N-75
5 ☐ Other	

Source Information (Please Print)

Premises: Li Tungsten
Address: [illegible] Hill Rd
Town: Glen Cove
Collection Point: across the road [illegible] Tungsten
[illegible] pile of soil – west of fenced tank
Sampler's Comments:
EP Toxicity
– access Janet Ct.
property

	Month	Day	Year
Date Collected	4	4	86
Date Received			8
Date Reported			8

Collection Time: 1:20 p.m.
Collected By: [illegible]

Bureau:
1 ☑ Land Resources Management
9 ☐ Other (specify)

Sample Type:
A ☐ Water
B ☑ Soil
C ☐ Sludge
D ☐ Waste Solvent
E ☐ Oil
F ☐ Other

CHEMICAL EXAMINATION

Check	Metals		Result	Check	Non-Metals		Result
1	Aluminum	mg/l	<0.5	15	Chloride	mg/l	
2	Arsenic	mg/l	0.041	16	Cyanide	mg/l	
3	Barium	mg/l	<0.5	17	Fluoride	mg/l	
4	Cadmium	mg/l	<0.001	18	MBAS	mg/l	
5	Chromium, Total	mg/l	<0.01	19	pH initial		3.6
6	Copper	mg/l	1.17	20	Phenols	mg/l	
7	Iron, Total	mg/l	3.75	21	Solids, Suspended	mg/l	
8	Lead	mg/l	0.09	22	Solids, Total Diss.	mg/l	
9	Manganese	mg/l	0.15	23	Sulfate	mg/l	
10	Mercury	mg/l	<0.0005	24	Ammonia nitrogen	mg/l	
11	Nickel	mg/l	<0.05	25	Kjeldahl nitrogen	mg/l	
12	Selenium	mg/l	<0.005	26	Nitrite nitrogen	mg/l	
13	Silver	mg/l	<0.05	27	Nitrate nitrogen	mg/l	
14	Zinc	mg/l	0.13	28	Total Phos.	mg/l	

SPECIAL ANALYSIS

Check	Constituent		Result
29	Chromium hex.	mg/l	
30	final pH		3.6
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			

Examiner's Comments

MAY 16 1986

100621

LABORATORY REPORT
CHEMICAL EXAMINATION OF INDUSTRIAL AND HAZARDOUS WASTES
Division of Laboratories and Research
County Department of Health

1 ☒ Routine
2 ☐ Resample
3 ☐ Special
4 ☐ Complaint
5 ☐ Other

Lab. No. 1913

Field No. VN-76

Source Information (Please Print)

Premises: Li Tungsten
Address: [illegible]
Town: Glen Cove
Collection Point: across the street from Li Tungsten soil/runoff - running in SE direction

	Month	Day	Year
Date Collected	[illegible]	[illegible]	8[illegible]
Date Received			8
Date Reported			8

Collection Time: [illegible]
Collected By: [illegible]

Sampler's Comments:
[illegible] Toxicity - across [illegible]
[illegible] property

Bureau:
1 ☒ Land Resources Management
9 ☐ Other (specify)

Sample Type:
A ☐ Water
B ☒ Soil
C ☐ Sludge
D ☐ Waste Solvent
E ☐ Oil
F ☐ Other

CHEMICAL EXAMINATION

	Metals		Result	Check	Non-Metals		Result
1	Aluminum	mg/l	<0.5	15	Chloride	mg/l	
2	Arsenic	mg/l	<0.005	16	Cyanide	mg/l	
3	Barium	mg/l	<0.5	17	Fluoride	mg/l	
4	Cadmium	mg/l	<0.001	18	MBAS	mg/l	
5	Chromium, Total	mg/l	<0.01	19	pH initial		3.8
6	Copper	mg/l	0.14	20	Phenols	mg/l	
7	Iron, Total	mg/l	0.19	21	Solids, Suspended	mg/l	
8	Lead	mg/l	0.09	22	Solids, Total Diss.	mg/l	
9	Manganese	mg/l	0.33	23	Sulfate	mg/l	
10	Mercury	mg/l	<0.0005	24	Ammonia nitrogen	mg/l	
11	Nickel	mg/l	<0.05	25	Kjeldahl nitrogen	mg/l	
12	Selenium	mg/l	<0.005	26	Nitrite nitrogen	mg/l	
13	Silver	mg/l	<0.05	27	Nitrate nitrogen	mg/l	
14	Zinc	mg/l	0.13	28	Total Phos.	mg/l	

SPECIAL ANALYSIS

Check	Constituent	Result
29	Chromium hex. mg/l	
30	final pH	3.1
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		

Examiner's Comments

MAY 16 1986

100622

REFERENCE NO. 23

0024-C
02-8703-68

New York State Department of Environmental Conservation
Wildlife Resources Center
Delmar, NY 12054

RECEIVED

APR 16 1987

NUS CORPORATION

SENT TO ________

Henry G. Williams
Commissioner

April 10, 1987

Mr. David J. Grupp
NUS Corporation
Fieldcrest Avenue
Raritan Plaza III
Edison, NJ 08837

Dear Mr. Grupp:

We have reviewed the Significant Habitat Program and the Natural Heritage Program files with respect to the proposed project in the Town of Oyster Bay, Nassau County, NY.

We have identified the following potential concerns:

One Mile Radius

Rare Plants

Aristolochia serpentaria - Virginia snakeroot. This was last collected in 1879 in the vicinity of Glen Cove, NY. This is listed as "SH", State Historical, by the NY Natural Heritage Program. This means that no extant sites are known but that it may be rediscovered.

Two Mile Radius

Rare Plants

Aristolochia serpentaria - Virginia snakeroot. This was last collected in 1915 in the vicinity of Sea Cliff, NY.

Asclepias variegata - White milkweed. This was collected in the vicinity of Glen Cove, NY; however, no date was recorded. It is listed as "S1," critically imperiled in NYS because of extreme rarity, by the NY Natural Heritage Program.

Significant Habitats

SW 30-009 - Hempstead Harbor. This area has been designated as a "Significant Coastal Fish and Wildlife Habitat" by the NYS Department of

State under Policy 7 of the Waterfront Revitalization and Coastal Resources Act of 1981. It is considered one of the 10 most important waterfowl wintering areas on the north shore of Long Island, most noted for scaup, canvasback and black ducks. In addition, the bay provides nursery and feeding habitat for striped bass, scaup, bluefish, Atlantic silverside, menhaden, winter flounder and blackfish.

Three Mile Radius

Rare Plants

Corydalis flavula - Yellow harlequin. This plant was last collected in 1907 in the vicinity of Manhasset Neck on the west side of Hempstead Harbor. It si listed as "S1" by the NY Natural Heritage Program.

Silene caroliniana va. pensylvanica - Wild pink. This plant was confirmed in 1986 in Locust Valley near Forest Avenue and Bayville Road. It is listed as "S3," rare in NY State, by the NY Natural Heritage Program.

Significant Habitats

SW 30-009 - (see description above)

SW 30-005 - Dosoris Pond and SW 30-006 - adjacent woodlands. Dosoris Pond is a relatively large, protected brackish pond, rare in Nassau County. The woodlands and wetlands surrounding the pond support several heron spp. as feeding and occasionally breeding habitat.

SW 30-011 - Estate lands south and east of Glen Cove. This general area supports a variety of wildlife including several amphibians and wintering waterfowl concentrations. Spotted salamander, a State listed special concern species, has been reported from an area near Matinecock.

SW 30-013 - Glen Cove to Mill Neck Bay Waterfowl Area. This offshore area is most noted for wintering scaup, mallard, Canada geese and black ducks. More information concerning these sites may be available from the following sources:

Protected Significant Coastal Fish and Wildlife Habitats

SW 30-009 - Hempstead Harbor	Mr. Thomas F. Hart NYS DOS 162 Washington Avenue Albany, NY 12231 (518) 474-3642

Rare Plants

Dr. Steven Clemants NY Natural Heritage Program Wildlife Resources Center Delmar, NY 12054 (518) 439-7488	or	Mr. Robert Zaremba The Nature Conservancy P.O. Box 72 Cold Spring Harbor, NY 11724 (516) 367-3225

Significant Habitats

Regional Wildlife Manager
NYS DEC
SUNY @ Stony Brook - Bldg. 40
Stony Brook, NY 11790
(516) 751-7900

Our files are continually growing as new habitats and occurrences of rare species and communities are discovered. In most cases, site-specific or comprehensive surveys for plant and animal occurrences have not been conducted. For these reasons, we can only provide data which has been assembled from our files. We cannot provide a definitive statement on the presence or absence of species, habitats or natural communities. This information should not be substituted for on-site surveys that may be required for environmental assessment.

If this project is still active one year from now we recommend that you contact us again so that we may update this response.

Requests for data from the New York Natural Heritage Program and the Significant Habitat Program are now being consolidated. When requesting information from our files please include a brief description of the proposed project and a photocopy of the appropriate topographic quadrangle(s) with the site or sites identified. All requests should be addressed as follows:

ATTN: Information Services
Significant Habitat Unit
NYS Dept. of Environmental Conservation
Wildlife Resources Center
Delmar, NY 12054-9767

Our phone number is (518)439-7486. Please make a note of these changes.

If we can be of further assistance please do not hesitate to contact us.

Sincerely,

John W. Ozard

John W. Ozard
Senior Wildlife Biologist
Significant Habitat Unit

cc: H. Knoch
T. Hart
S. Clemants
R. Zaremba

JWO:sjs

REFERENCE NO. 24

[6560-01]

[FRL 910-3]

AQUIFERS UNDERLYING NASSAU AND SUFFOLK COUNTIES, NEW YORK

Determination

Notice is hereby given that pursuant to Section 1424(e) of the Safe Drinking Water Act (42 U.S.C. 300f, 300h-3(e); 88 Stat. 1660 et seq.; Pub. L. 93-523) the Administrator of the Environmental Protection Agency has determined that the aquifer system underlying Nassau and Suffolk Counties, Long Island, New York, is the principal source of drinking water for these counties and that, if the aquifer system were contaminated, it would create a significant hazard to public health.

BACKGROUND

The Safe Drinking Water Act was enacted on December 16, 1974. Section 1424(e) of the Act states: "If the Administrator determines, on his own initiative or upon petition, that an area has an aquifer which is the sole of principal drinking water source for the area and which, if contaminated, would create a significant hazard to public health, he shall publish notice of that determination in the FEDERAL REGISTER. After the publication of any such notice, no commitment for Federal financial assistance (through a grant, contract, loan guarantee, or otherwise) may be entered into for any project which the Administrator determines may contaminate such aquifer through a recharge zone so as to create a significant hazard to public health but a commitment for Federal financial assistance may, if authorized under another provision of law, be entered into to plan or design the project to assure that it will not so contaminate the aquifer."

On January 21, 1975, the Environmental Defense Fund petitioned the Administrator to designate the aquifers underlying Nassau and Suffolk Counties, Long Island, New York, as a sole source aquifer under the provisions of the Act. A notice of receipt of this petition, together with a request for comments, was published in the FEDERAL REGISTER, Thursday, June 12, 1975. Written comments were submitted by the Environmental Defense Fund (EDF) on August 7, 1975, supporting their petition. A letter from the Director of the Nassau-Suffolk Regional Planning Board, dated October 1, 1976, requested that designation be delayed until after the completion of the areawide waste management (208) planning process for Long Island.

Because of the limited response to the FEDERAL REGISTER notice, EPA issued a press release and mailed an information sheet to elected officials and environmental groups on Long Island in March 1977. In addition, a presentation was made to the Citizens Advisory Committee (CAC) of the 208 planning agency and to the executive committee of the Long Island Water Conference. In response to these activities EPA received three comments: a letter from EDF questioning why project review would exclude direct Federal projects, a letter from a member of the East Hampton Planning Board expressing support for the designation, and a letter from the CAC requesting that designation be delayed until after the completion and approval of the Long Island 208 plan.

In considering the comments received, we could not agree with the letters requesting further delay since we do not believe that the review process under Section 1424(e) will constrain the options of 208 planning.

On the basis of the information which is available to this Agency, the Administrator has made the following findings, which are the basis for the determination noted above:

(1) The aquifers underlying Nassau and Suffolk Counties are the sole or principal drinking water source for the area. They supply good quality water for about 2.5 million people. Current water supply treatment practice for public supplies is generally limited to disinfection for drinking purposes, with some plants capable of nitrate removal. There are also numerous private sources. There is no alternative source of drinking water supply which could economically replace this aquifer system.

100629

(2) The aquifer system is vulnerable to contamination through its recharge zone. Since contamination of a ground-water aquifer can be difficult or impossible to reverse, contamination of the the aquifer system underlying Nassau and Suffolk Counties, New York, would pose a significant hazard to those people dependent on the aquifer system for drinking purposes.

Among the determinations which the Administrator must make in connection with the designation of an area under Section 1424(e) is that the area's sole or principal source aquifer or aquifers, "if contaminated, would create a significant hazard to public health * * *" Obviously, threats to the quality of the drinking water supply for such a large population could create a significant hazard to public health. The EPA does not construe this provision to require a determination that projects planned or likely to be constructed will in fact create such a hazard; it is sufficient to demonstrate that approximately 2.5 million people depend on the aquifer system underlying Nassau and Suffolk Counties as their principal source of drinking water, and that the aquifer system is vulnerable to contamination through its recharge zone.

Section 1424(e) of the Act requires that a Federal agency may not commit funds to a project which may contaminate the aquifer system through a recharge zone so as to create a significant hazard to public health. The recharge zone is that area through which water enters into the aquifer system. Because of groundwater movement within these aquifers, the recharge zone is considered to be the entire area of Nassau and Suffolk Counties. However, both horizontal and vertical boundaries of the recharge zone are discussed in the background document under the section entitled "Area of Consideration."

The data upon which these findings are based are available to the public and may be inspected during normal business hours at the office of the Environmental Protection Agency, Region II, 26 Federal Plaza, New York, New York 10007. It includes a support document for designation of the aquifers underlying Nassau and Suffolk Counties, New York, and maps of the area within which projects will be subject to review.

A copy of the above documentation is also available at the U.S. Waterside Mall, Environmental Protection Agency, Public Information and Reference Unit, Room 2922, 401 M Street S.W., Washington, D.C. 20460.

The EPA has issued proposed regulations for the selective review of Federal financially assisted projects which may contaminate the aquifer system underlying Nassau and Suffolk Counties, New York, through the recharge zone so as to create a significant hazard to public health. These proposed regulations were published in the FEDERAL REGISTER issue of September 29, 1977, and public comments were requested. They will be used as interim guidance for project review until their promulgation during 1978.

EPA, Region II, is working with the Federal agencies which may in the near future fund projects in the area of concern to EPA to develop interagency procedures whereby EPA will be notified of proposed commitments for projects which could contaminate the bicounty area's sole source aquifer system. Although the project review process cannot be delegated, the Regional Administrator in Region II will rely to the maximum extent possible upon any existing or future State and local control mechanisms in protecting the ground-water quality of the aquifer system underlying Nassau and Suffolk Counties, New York. Included in the review of any Federal financially assisted project will be coordination with the State and local agencies. Their determinations will be given full consideration and the Federal review process will function so as to complement and support State and local mechanisms.

Dated: June 12, 1978.

DOUGLAS M. COSTLE,
Administrator.

[FR Doc. 78-17067 Filed 6-20-78; 8:45 am]

100630

REFERENCE NO. 25

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II

IN THE MATTER OF LI TUNGSTEN SITE Glen Cove Development Company, Respondent. Proceeding Under Section 106(a) of the Comprehensive Environmental Response, Compensation and Liability Act (42 U.S.C. § 9606(a)).	ADMINISTRATIVE ORDER ON CONSENT Index No. II CERCLA-90215

JURISDICTION

1. THIS ADMINISTRATIVE ORDER ON CONSENT ("Consent Order") IS ISSUED to the Glen Cove Development Company ("Respondent"), by the United States Environmental Protection Agency ("EPA") pursuant to the authority vested in the President of the United States by Section 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. § 9606(a), which authority was delegated to the Administrator of EPA by Executive Order 12580, dated January 23, 1987, and duly redelegated to the Regional Administrator of EPA Region II. Notice of this Consent Order has been given to the New York State Department of Environmental Conservation ("NYSDEC"), as required by Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

2. Respondent agrees to undertake all actions required by the terms and conditions of this Consent Order, including, but not limited to, the Scope of Work ("Appendix A") and the Compliance Schedule ("Appendix B") which are attached hereto and incorporated herein.

3. Respondent agrees not to contest the authority or jurisdiction of the Regional Administrator to issue this Consent Order and also agrees not to contest the terms of this Consent Order in any action to enforce its provisions.

4. This Consent Order shall apply to and be binding upon Respondent, as well as its agents, officers, directors, officials, contractors, receivers, trustees, successors and assigns.

DEFINITIONS

5. Unless otherwise defined herein, terms used in this Consent Order that are defined in Section 101 of CERCLA, 42 U.S.C. § 9601, shall have the meanings ascribed to them therein.

FINDINGS OF FACT AND CONCLUSIONS OF LAW

6. Respondent is a general partnership duly organized and existing under the laws of the State of New York and is owned by the Old Court Holdings Company and the Old Court Joint Ventures, Inc..

7. Respondent owns property, located at the intersections of Herbhill Road and Dickson Lane in the City of Glen Cove, Nassau County, New York, known as the Li Tungsten Corporation facility (hereinafter referred to as the "Facility" or the "Site").

8. The Facility includes approximately ten (10) buildings and is located in a commercial area within one quarter of a mile of a public recreation area and residential dwellings. The Facility is situated above a sole source aquifer and is bounded to the south by the Glen Cove Creek into which surface water run-off discharges. The Glen Cove Creek is a tidal creek of Glen Cove Harbor.

9. Between 1941 and June of 1985, raw ore and scrap metals were processed at the Facility to produce an enriched tungsten product.

10. From 1941 to 1972, the Facility was owned and operated by the Wah Chang Smelting and Refining Company of America, Inc. ("Wah Chang"). In 1972, Wah Chang formed a wholly owned subsidiary, known as the Li Tungsten Corporation. Wah Chang retained title to the property and leased the premises to the Li Tungsten Corporation which, in turn, operated the Facility.

11. In November of 1984, Respondent purchased the Facility and the Li Tungsten leasing arrangement from Wah Chang and continued the lease arrangement with the Li Tungsten Corporation. In June of 1985, the Li Tungsten Corporation ceased operations at the Facility and filed a voluntary petition for bankruptcy pursuant to Chapter 11 of the Bankruptcy Code. No manufacturing operations have been conducted at the Site since June of 1985.

12. Prior to the issuance of this Consent Order, Respondent, through its consultants, undertook the following measures at the Site:

a) an external inspection of fifty tanks at the Facility to determine whether they were secure against rupture or leakage;

b) the sampling, draining, and drumming for disposal of the contents of two tanks determined not to be secure;

c) the packing of identifiable laboratory contents at the Facility;

d) the over-packing and/or staging of 108 drums containing acids, crganics, and waste oil to a secure area at the Site;

e) the inventory, sampling, and removal of pressurized gas cylinders;

f) the removal of approximately one tank truck of anhydrous ammonia from the Facility, and

g) the establishment of twenty-four hour security at the Facility.

13. On March 29, 1989, NYSDEC inspected the Site and conducted an initial survey of the conditions as they existed at the Site at that time. NYSDEC reported the presence of, among other things, (a) approximately one hundred (100) drums containing liquid chemicals which were tentatively identified as containing cyanide, acids. and alkalis, (b) numerous storage tanks containing unknown quantities of liquid chemicals, (c) approximately twenty-six (26) pressurized cylinders containing chemicals, and (d) approximately twelve (12) transformers, some of which are leaking and are suspected to contain polychlorinated biphenyls ("PCBs"). The survey also revealed elevated radiation levels, the source of which is believed to be radium, thorium, and uranium, which are associated with ore from certain sources and is present as a result of the tungsten refining and manufacturing process.

14. On April 14, 1989, NYSDEC formally requested that EPA undertake appropriate response action at the Site pursuant to CERCLA, at which time EPA also assumed the lead enforcement role with regard to response actions at the Site.

15. On April 16 and 26-28, 1989, EPA inspected the Facility and conducted a preliminary investigation. The investigation confirmed the conditions reported by NYSDEC and tentatively identified the contents of the drums, including hydrofluoric acid, nitric acid, hydrochloric acid, carbon tetrachloride, and perchloroethylene ("PCE"). A number of the

drums containing processed wastes and solids are badly corroded with portions of their contents deposited onto warehouse floors and the yard at the Facility.

16. The substances present at the Site can cause a variety of adverse human health effects with prolonged or direct exposure, including adverse effects on the central nervous system, the respiratory system, and the cardiovascular system.

17. The Facility constitutes a "facility" within the meaning of Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

18. Cyanide, hydrofluoric acid, nitric acid, hydrochloric acid, carbon tetrachloride, and PCE are hazardous substances, as that term is defined in Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

19. Releases and/or threatened releases of hazardous substances have occurred at the Site, as that term "release" is defined in Section 101(22) of CERCLA, 42 U.S.C. § 9601(22), in that, among other things, such substances have leaked, spilled, been abandoned and/or have been otherwise released into the environment. In addition, there is a threat of further releases at and from the Site.

20. Conditions present at the Site pose a threat to the public health or welfare or the environment, based on factors set forth at Section 300.65(b)(2) of the National Contingency Plan ("NCP"), 40 C.F.R. § 300.65(b)(2) (July 1, 1986), including, but not limited to, the following:

a) Actual or potential exposure to hazardous substances or pollutants or contaminants by nearby populations, animals, or food chain;

b) Actual or potential contamination of drinking water supplies or sensitive ecosystems;

c) Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release;

d) Other situations or factors which may pose threats to public health or welfare or the environment.

21. Respondent is a "person", as defined in Section 101(21) of CERCLA, 42 U.S.C. § 9601(21), and an owner and/or operator as defined in Section 101(20)(A), 42 U.S.C. § 9601(20)(A) of the Facility. Respondent is thus a responsible

party under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), and is liable for all costs of response, plus interest, incurred by the United States Government.

22. Respondent has been given an opportunity to discuss with EPA the basis for issuance of this Consent Order and its terms. Respondent has prepared Appendices A and B, attached hereto, for the performance of a removal action at the Site.

23. Respondent does not, by signing this Consent Order, concede that the "Findings of Fact and Conclusions of Law" set forth herein are correct or complete. Nor does Respondent admit that it is in any way responsible for any contamination at the Site or in any way liable for future response action(s) at the Site or any costs attendant to such response action(s).

DETERMINATION

Based on the FINDINGS and CONCLUSIONS set forth above, EPA Region II has determined that the release or threatened release of one or more hazardous substances or pollutants or contaminants from the Facility may present an imminent and substantial endangerment to the public health or welfare or the environment within the meaning of Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

ORDER

Based on the foregoing FINDINGS, DETERMINATION, and the entirety of the Administrative Record, IT IS HEREBY ORDERED that, to protect the public health, welfare, and the environment, it is necessary that certain actions be taken to abate the conditions at the Site, and further, that Respondent shall undertake a response action at the Site in accordance with the requirements specified below. All activities set forth below shall be initiated and completed as soon as possible, even though maximum time periods for their completion are specified in Appendix B.

DESCRIPTION OF WORK

24. Respondent agrees to implement the work set forth in Appendix A within the time frames established in Appendix B, both of which are attached hereto and which include plans for the following:

a) providing continuing Site security;

b) containing and addressing materials exhibiting elevated radioactivity;

c) securing and disposing of laboratory chemicals;

d) inventory and removal of drums containing chemicals;

e) characterization of the tanks at the Site;

f) precautionary monitoring and selected sampling of asbestos at the Site;

g) sampling and analysis of sediments from the creek adjacent to the Facility;

h) inventory and characterization of transformers at the Site, and

i) clean-up of mercury spill within a building at the Site.

25. Appendices A and B attached hereto shall be deemed incorporated into and an enforceable part of this Consent Order.

26. EPA approval of all plans, reports, and other submittals required under the terms of this Consent Order shall constitute a finding that such submittals are deemed consistent with the NCP.

27. EPA shall make the final determination as to the sufficiency and/or acceptability of all work, as set forth in Appendix A, conducted under this Consent Order, including but not limited to each required submittal.

DESIGNATED COORDINATOR, ON-SCENE COORDINATOR, OTHER PERSONNEL

28. Within three (3) calendar days of the effective date of this Consent Order, Respondent shall select a coordinator, to be known as the Designated Coordinator, and submit the name, address, and telephone number of the Designated Coordinator to Charles Fitzsimmons, the EPA On-Scene Coordinator ("OSC") and Alison Hess, the EPA Enforcement Project Officer, as set forth in paragraph 35 of this Consent Order. The Designated Coordinator shall be responsible for the Respondent's oversight of implementation of this Consent Order. The OSC and the Enforcement Project Officer are the persons designated by EPA to be responsible for on-scene monitoring of actions and activities required pursuant to this Consent Order. All EPA correspondence to the Respondent shall be sent promptly, in writing, to the Designated Coordinator. EPA will notify the Designated Coordinator if there is a personnel change in either the OSC or Enforcement Project Officer position.

29. All activities required of Respondent under the

terms of this Consent Order shall be performed only by qualified persons possessing all necessary permits, licenses, and other authorizations required by federal, state, and local governments.

30. As appropriate during the course of implementation of the actions required of Respondent pursuant to the Consent Order, Respondent or its consultants or contractors, acting through the Designated Coordinator, may confer with the EPA concerning the required actions. Based upon new circumstances or new information not in the possession of the EPA on the date of issuance of this Consent Order, the Designated Coordinator may submit a request to EPA, in writing, as set forth in paragraph 35 of this Consent Order, for approval of a modification to Appendices A and B. If approved by EPA in writing, such modification shall be deemed incorporated into this Consent Order.

31. In the event of a significant change in conditions at the Site, the Designated Coordinator shall immediately notify the EPA Enforcement Project Officer, at (212) 264-6040, and the EPA OSC, at the following telephone numbers: (201) 321-6608 (during business hours), or (201) 548-8730 (after business hours). In the event that EPA determines that the activities performed pursuant to this Consent Order or any emergency circumstance occurring at the Site pose a threat to human life or health or the environment, EPA may direct Respondent to cease further implementation of any actions pursuant to this Consent Order or to take other and further actions reasonably necessary to abate the threat. This provision is not to be construed so as to limit any powers EPA may have under Section 300.65 of the NCP, 40 C.F.R. § 300.65, or any other applicable provision of the NCP, or under any other applicable law or regulation.

32. Respondent's activities under this Consent Order shall be performed within the time limits set forth in Appendix B unless performance is delayed by events which constitute force majeure. For purposes of this Consent Order, force majeure is defined as any event arising from circumstances which are beyond the control of Respondent and could not have been avoided by the exercise of due care. Financial considerations shall not be considered circumstances beyond the control of Respondent. When an event constituting force majeure occurs, Respondent shall be obligated to perform the affected activities within a time period which shall be extended for a period of time reasonably attributable to force majeure. Respondent shall notify the EPA in writing, in the manner set forth in paragraph 35 of this Consent Order, as soon as possible following Respondent's awareness that circumstances constituting force majeure have occurred or are likely to occur. Failure by respondent to notify EPA in a timely manner shall constitute a waiver of its right to assert force majeure as a defense in any action brought by EPA to enforce the terms of this Consent Order. The burden of proving

that an event constituting force majeure has occurred shall rest with Respondent.

REPORTING REQUIREMENTS

33. All reports and other documents submitted by Respondent to EPA (other than the bi-monthly progress reports referred to in paragraph 34) which purport to document Respondent's compliance with the terms of this Consent Order shall be signed by a corporate officer of Respondent or the Designated Coordinator on behalf of Respondent.

34. Respondent shall provide bi-monthly written progress reports to the EPA Enforcement Project Officer and the OSC. Such reports shall fully describe all actions and activities undertaken and all validated sampling results obtained pursuant to this Consent Order since the prior report, as well as anticipated activities to be conducted at the Site during the next reporting period.

35. All submittals and notifications to EPA pursuant to this Consent Order shall be made in writing, with one copy sent to the OSC:

Charles Fitzsimmons - Li Tungsten OSC
Response and Prevention Branch
U.S. Environmental Protection Agency
Woodbridge Avenue
Edison, NJ 08837
(201) 321-6608

and two copies sent to the Enforcement Project Officer:

Carole Petersen, Chief
New York/Caribbean Compliance Branch
Emergency and Remedial Response Division
U.S. EPA, Region II
Room 737
26 Federal Plaza
New York, NY 10278
Attn: Alison Hess
Enforcement Project Officer
(212) 264-6040

All notices required to be given to Respondent pursuant to the terms of this Consent Order shall be sent to the Designated Coordinator, with one copy to the following addressees:

Debra Rothberg, Esq.
Jones, Day, Reavis & Pogue
599 Lexington Avenue
New York, NY 10022

Glen Cove Development Company
34 Market Place, Suite 301
Baltimore, MD 21202

Attn: Li Tungsten

ACCESS AND AVAILABILITY OF DATA

36. Respondent shall in no way hinder full and unimpeded access to the Site or any structure at the Site by EPA and NYSDEC, as well as their respective representatives, agents, employees, contractors and consultants. Respondent shall not prohibit such persons from being present at the Site at any and all times and from observing any and all activities conducted pursuant to this Consent Order. If Respondent is unable to obtain access to any portion of the Site, Respondent shall make its best effort to obtain access to any such portion of the Site prior to requesting that EPA assist in obtaining such access.

37. In accordance with applicable law, EPA and NYSDEC shall have full access to all records, including, but not limited to, contractual documents maintained or created by Respondent or its contractors or consultants in connection with implementation of the work under this Consent Order (except for records which are propoerly asserted as attorney work product or attorney/client privilege). In addition, all data, information, and records created or maintained in connection with implementation of the work under this Consent Order shall, upon request, be available to EPA without delay, and all persons, including employees and contractors, who engage in activity under this Consent Order shall be available to and shall cooperate with the United States and/or EPA in providing such sources of information.

38. Respondent agrees to preserve, during the pendency of this Consent Order and for a minimum of eight (8) years after its termination, all records and documents in its possession or in the possession of its employees, agents, or contractors which in any way relate to the Site, despite any internal document retention policy to the contrary. After this eight year period, Respondent shall notify EPA at least thirty (30) calendar days prior to the destruction of any such documents. Upon request by EPA, Respondent shall make available to EPA such records or copies of any such records (except for records which are properly asserted as attorney work product or attorney/client privilege). Additionally, if EPA requests that some or all documents be preserved for a longer period of time, Respondent shall either comply with that request or provide the originals or copies, if such originals are not available, of the requested documents to EPA.

39. Respondent agrees not to conduct any response action at the Site, except those specifically referenced in Appendix A, without receiving written approval in advance by EPA.

40. Upon request by the EPA, Respondent shall provide split samples of any material sampled in connection with implementation of this Consent Order.

GENERAL PROVISIONS

41. All actions and activities carried out by Respondent pursuant to this Consent Order shall be done in accordance with all applicable federal, state, and local laws, regulations, and requirements and with CERCLA, the NCP, and any amendments thereto which may become effective prior to the date of EPA certification of completion, as set forth in paragraph 57, infra.

42. Any waste disposal conducted by Respondent pursuant to this Consent Order shall comply with all requirements of CERCLA, 42 U.S.C. §§ 9601-9675, including Section 121(d)(3), 42 U.S.C. § 9621(d)(3), RCRA, 42 U.S.C. §§ 6901-6991, the Toxic Substances Control Act ("TSCA"), 15 U.S.C. §§ 2601-2654, and all regulations and guidance promulgated pursuant thereto.

43. EPA shall be notified, in the manner set forth in paragraph 35 of this Consent Order, of the selection of any waste treatment, storage, or disposal facilities to be utilized for waste disposal conducted pursuant to this Consent Order at least five (5) days prior to off-site shipment of such wastes.

44. In the event that, for any reason, off-site treatment or disposal facilities are not available at the time Respondent may require such facilities for the completion of tasks required under this Consent Order, Respondent shall arrange, subject to EPA approval, for an authorized facility to store these wastes until such disposal or treatment facilities are available.

45. All sampling and analyses performed pursuant to this Consent Order shall conform to EPA Quality Assurance/Quality Control (QA/QC) and Chain of Custody procedures as set forth in Appendix A to this Consent Order.

46. All records produced by Respondent and delivered to the EPA in the course of implementing this Consent Order shall be available to the public unless identified as confidential by Respondent pursuant to 40 C.F.R. Part 2, Subpart B, and determined by EPA to merit confidential treatment, in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and applicable regulations.

47. Neither EPA nor the United States, by issuance of this Consent Order, assumes any liability for any acts or

omissions by Respondent, or Respondent's employees, agents, contractors or consultants in carrying out any action or activity pursuant to this Consent Order, nor shall EPA or the United States be held as a party to any contract entered into by Respondent, Respondent's officers, employees, agents, contractors or consultants in carrying out any action or activity pursuant to this Consent Order.

48. Nothing contained in this Consent Order shall affect Respondent's right to seek and obtain contribution or indemnification from other parties potentially liable for conditions which exist at the Site, except as limited by the rights reserved to EPA under Section 113 of CERCLA, 42 U.S.C. § 9613.

49. Nothing contained in this Consent Order shall affect any right, claim, interest, defense, or cause of action of any party hereto with respect to third parties.

50. EPA reserves the right to pursue third parties within its enforcement discretion for response actions and or cost recovery in connection with the Site.

51. Respondent agrees to reimburse EPA for all response costs incurred by the U.S. Government prior to the issuance and during the performance of the Consent Order. EPA shall transmit to Respondent periodic accountings of all such response costs with a narrative of the activities for which the costs were incurred. The response costs shall include those incurred by EPA, or by a contractor selected by EPA, with respect to work conducted by Respondent associated with the actions undertaken pursuant to this Consent Order. Within ten (10) business days of receipt of an accounting, Respondent will remit a check for the amount of those costs, made payable to the Hazardous Substance Superfund. Checks should specifically reference the identity of the Superfund site and the index number of this Consent Order. Payment should be sent to:

U.S. Environmental Protection Agency - Region II
Superfund Accounting
P.O. Box 360188M
Pittsburgh, PA 15251

A letter of explanation shall accompany the payment; a copy of the letter shall be sent to the Chief, New York/Caribbean Compliance Branch (whose address appears in paragraph 35 of this Consent Order).

52. Nothing herein shall constitute or be construed as a satisfaction or release from liability for Respondent, or Respondent's agents, contractors, lessees, receivers, successors or assigns with respect to any conditions or claims arising as a

result of past, current, or future operations, ownership, use of the Site, or disposal at the Site of hazardous substances. Respondent also agrees to indemnify and hold harmless EPA and the United States Government, its agencies, departments, agents, and employees for all claims, causes of action, damages, and costs of any type or description by third parties for any injuries or damages to persons or property resulting from acts or omissions of Respondent or its officers, directors, officials, receivers, trustees, successors, or assigns in carrying out any activities at the Site.

53. Nothing in this Consent Order constitutes a decision on pre-authorization of funds under Section 111(a)(2) of CERCLA, 42 U.S.C. § 9611(a)(2). Furthermore, Respondent agrees that it will not petition for reimbursement under Section 106(b) of CERCLA, 42 U.S.C. § 9606(b), for the performance of any actions required under this Consent Order.

ENFORCEMENT

54. Failure of Respondent to satisfy any terms of this Consent Order completely and expeditiously may result in EPA taking the required actions unilaterally, pursuant to Section 104 of CERCLA, 42 U.S.C. § 9604.

55. If Respondent fails, without prior EPA approval, to comply with any of the requirements or deadlines set forth in this Consent Order, Respondent shall each make payments to the EPA in the amount indicated below for each day of non-compliance:

Days After Required Date	Stipulated Penalties
11 to 20 days	$1000.00
21 to 30 days	$3000.00
31 to 45 days	$5000.00

Any such penalty shall accrue as of the sixth day after the applicable deadline has passed and shall be due and payable ten days following receipt of the written demand from EPA or, if no such demand is received, on the thirtieth day following the date the penalty begins to accrue and shall be due and payable every thirtieth day thereafter. Payment of any such penalty to the EPA shall be made to EPA by certified check in accordance with paragraph 51 of this Consent Order. After forty-five consecutive days of non-compliance, EPA reserves the right to pursue civil penalties up to $25,000 per day pursuant to Section 106(b) of CERCLA, 42 U.S.C. § 9606(b), in lieu of these stipulated penalties.

56. Violation of this Consent Order as a result of Respondent's failure to comply with any provision herein, including but not limited to any failure to comply with Appendices A and B, attached hereto, shall be enforceable pursuant to Sections 106(b) and 113(b) of CERCLA, 42 U.S.C.

§§ 9606(b) and 9613(b). Respondent may also be subject to an action for cost recovery, civil penalties of up to $25,000 per day of violation of this Consent Order, and/or punitive damages (including treble damages), as provided in Sections 107(a), 106(b), and 107(c)(3) of CERCLA, 42 U.S.C. §§ 9607(a), 9606(b), and 9607(c)(3), respectively, for failure to comply with the terms of this Consent Order. Nothing herein shall preclude EPA from taking any additional enforcement actions, and/or other actions as it may deem necessary for any purpose, including the prevention or abatement of an imminent and substantial danger to the public health, welfare, or the environment arising from conditions at the Site, and recovery of the costs thereof.

Termination and Satisfaction

57. The provisions of this Consent Order shall be deemed satisfied upon receipt by Respondent of written certification from EPA that Respondent has demonstrated that all of the terms of this Consent Order, including, but not limited to, Appendices A and B, have been completed in accordance with the terms hereof to the satisfaction of EPA.

58. When Respondent concludes that it has completed the work required under the terms of this Consent Order, Respondent shall so notify EPA by submitting documentation demonstrating that it has complied with and completed the implementation of this Consent Order. That documentation shall further include a certification statement, signed by a responsible corporate officer of Respondent, which states the following:

> "I certify that the information contained in or accompanying this submission is true, accurate, and complete.
>
> "As to (the) (those) identified portions(s) of this submission for which I cannot personally verify (its) (their) truth and accuracy, I certify, as the company official having supervisory responsibility for the person(s) who, acting under my direct instructions, made the verification that the information is true, accurate, and complete."

Following receipt of the aforementioned documentation, and if EPA determines that the work required has been carried out in accordance with the terms of this Consent Order, EPA will notify Respondent to that effect, in writing, as set forth in paragraph 57.

59. This Consent Order shall be effective on the date of receipt of an executed copy by Counsel for Respondent. All times for performance of activities required herein will be calculated from the effective date.

U.S. ENVIRONMENTAL PROTECTION AGENCY

James R. Marshall for

WILLIAM J. MUSZYNSKI, P.E.
Acting Regional Administrator
U.S. Environmental Protection Agency
Region II

7/21/89

Date of Issuance

APPENDIX A

SCOPE OF WORK

INTERIM ACTIONS
AT THE
LI TUNGSTEN SITE
63 HERB HILL ROAD
GLEN COVE, NEW YORK

Prepared by:

FRED C. HART ASSOCIATES, INC.
530 FIFTH AVENUE
NEW YORK, NEW YORK 10036-5166

July 17, 1989

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1.0 INTRODUCTION

The Li Tungsten facility (herein after referred to as the "Site") is located at 63 Herb Hill Road, Glen Cove, New York. The Site is 26 acres and consists of three separate parcels. The main operations at the Site were conducted on the parcel bordered by Glen Cove Creek to the south and Herb Hill Road to the north and a second parcel to the west of Dickson Lane. The parcel bordered by Herb Hill Road on the south and Dickson Lane on the west contains no facility structures. A map of the Site is provided in Figure 1.

Based on documents in the possession of the Glen Cove Development Company (GCDC) and obtained from records maintained at the Site the following background information was developed. The Site was operated from the 1940's to approximately 1985 by the Wah Chang Trading Company and its wholly owned subsidiary the Li Tungsten Corporation. The operation involved the processing of ore and scrap tungsten concentrates to ammonium paratungstate (APT) and subsequently formulating APT to metal tungsten powder and tungsten carbide powder. Other specialty products such as tungsten carbide powder plus cobalt and other material for plasma spraying; tungsten titanaium carbide powder; tantalum carbide powder; tungsten spray powder; crystalline tungsten powder; and, molybdenum spray powder were also produced.

The property was acquired by GCDC in 1984 and leased to The Li Tungsten Corporation. The market for tungsten was apparently depressed by the 1980's and operations at the Li Tungsten facility had slowed by this time. The Li Tungsten operation declared bankruptcy in 1985.

GCDC is a New York State general partnership jointly owned by Old Court Joint Ventures, Inc. and Old Court Holdings Corporation, Inc., both of which in turn are wholly-owned subsidiaries of Old Court Savings and Loan, Inc. (in Receivership) located in Maryland.

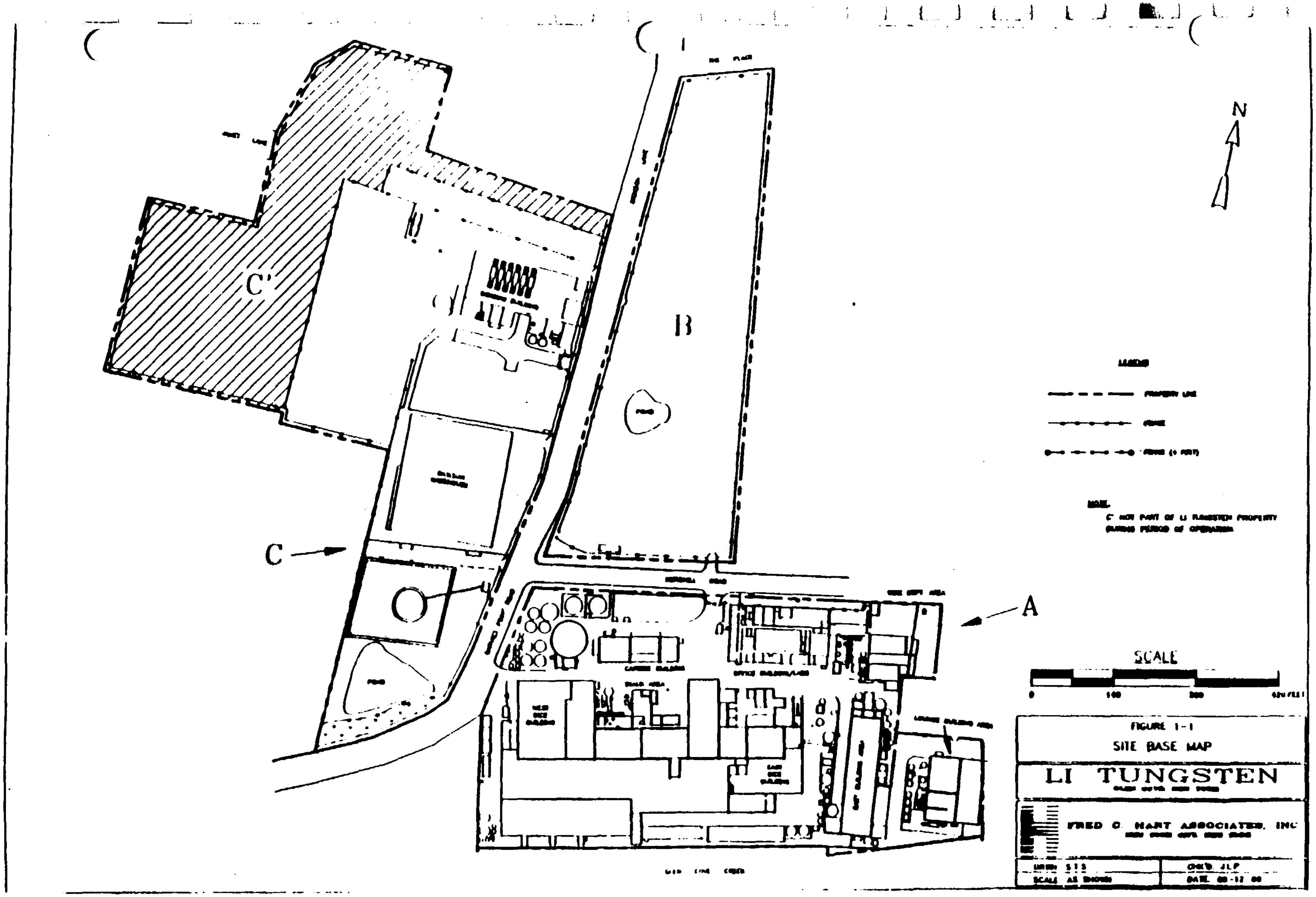

Figure 1

Li Tungsten Facility

Fred C. Hart Associates, Inc. (HART) was retained by GCDC to coordinate implementation of interim actions to address certain environmental conditions at the Site. This scope of work (SOW) sets forth those proposed interim actions which were identified by the United States Environmental Protection Agency (USEPA) Region II pursuant to its authority under The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 42 U.S.C. Section 9601 et. seq. This scope of work is prepared as an attachment to the USEPA Administrative Order on Consent, Index No. II CERCLA-90215. The work proposed in this document will be consistent with practices described in:

"Characterization of Hazardous Waste Sites". NTIS PB87-120291, August 1985.

"Guidance Document for Clean-up of Surface Tank and Drum Sites". NTIS PB87-110672, May 1985.

"Drum Handling Practice at Hazardous Waste Sites". NTIS PB86-165362 OSHA, January 1986.

"29 CFR 1910.120 OSHA Regulations."

"EPA Standard Operating Safety Guidelines". OSWER 10/88.

All sampling and analyses performed by respondent shall conform to the USEPA quality assurance/quality control (QA/QC) and chain of custody procedures and in conformance with the USEPA publication entitled, Test Methods for Evaluating Solid Waste (SW-846 November 1986 as updated) and the USEPA document entitled, Guidance for Preparation of Combined Work/QA Project Plan for Environmental Monitoring (OAMS 005/80).

2.0 PURPOSE

This SOW outlines plans for interim actions at the Site. These interim actions were identified by the USEPA because of concerns regarding the stability and security of the Site. GCDC proposes to undertake interim actions identified in this document pursuant to the aforementioned administrative order.

As stated during previous discussions with the USEPA, GCDC, through the Receivership, must comply with strict guidelines regarding the allocation of funds. To obtain approval for funding for one or more items, a fairly accurate cost estimate or range is required. The Circuit Court in Baltimore monitoring the Receivership must authorize expenditure of any funds. As a result, an order must be signed by the Circuit Court in Baltimore to formally allocate the funds to complete these interim actions. The court is expected to issue this order by June 12, 1989. GCDC through the receivership has obtained approval for a few of these items and has completed or is in the process of completing some of these actions.

3.0 INTERIM ACTIONS

The following interim actions were discussed at two meetings with the USEPA. Those interim actions which have already been completed (i.e. MEKP and cylinder removal) are not discussed or included on the schedule. The remaining interim actions and the plans for implementation are discussed in the following sections. A schedule for completion of these actions is also included.

3.1 Site Security

Based upon the USEPA reconnaissance of the Site, security was identified to be a major concern. Because of damage to the perimeter fence or the absence of a fence in some areas, access to the Site could not be controlled. Although one 24 hour guard is stationed and periodically patrols in a marked car outside the boundary of the Site, the USEPA believes that certain areas may not be readily accessible to a lone security patrol (northwestern boundary of the Site parcel just west of Dickson Lane). Therefore EPA requested that in addition to GCDC proceeding with fencing, the security patrol at the Site be upgraded.

3.1.1 Proposed Action. GCDC is proceeding with securing the Site perimeter with fencing. A priority will be given to installing a line of fence to impede access along the northwestern perimeter of the parcel located west of Dickson Lane. As of this date, all repairs have been made to the existing fence and gates. The fence posts along the northwestern parcel have been installed. Fencing in this area and between Chemco and the Site parcel north of Herb Hill Road is expected to be completed by June 23, 1989. Furthermore, GCDC has placed another security guard in a marked vehicle for the 8-hour shift from approximately 4:00 p.m. to midnight. This guard is stationed along the Site perimeter on Dickson Lane. A security presence in this area, for the period of time proposed, is intended to dissuade trespassers from entering the northwest Site parcel. During the course of implementing one or more of the interim actions, workers will be on-site during the day and it is less likely that unauthorized individuals will trespass. As certain interim actions are completed, (i.e. fencing completion etc.) GCDC would like the opportunity to downgrade the security force. Funds which do not have to be expended on guards can be targeted for additional stabilization and/or removal actions.

3.2 Radioactive Materials

USEPA has recommended the collection, staging and subsequent removal of isolated drums or containers of residual ore or slag that has exhibited elevated radioactivity readings. These drums or containers have been identified via preliminary radiological surveys conducted by Nassau County Department of Health (NCDOH) and listed in their status reports. The USEPA also did some preliminary radiological surveying and will provide maps depicting the location of the containers it identified to the extent it differs from those items in the NCDOH report.

3.2.1 Proposed Action. The NDL Organization has been contracted to undertake a comprehensive, real-time radiological survey both inside and outside the Site buildings. The purpose of this survey would be to identify any areas where on-site worker access needs to be restricted as a result of radioactivity levels and/or any special protective measures to be taken while working in those areas. Since worker access to many areas of the Site will be required to complete other interim actions or future remedial work, this radiological survey is prudent and necessary. With the USEPA approval, this survey will include:

1) a gamma ray survey of the property and buildings on an approximate 25 foot x 25 foot grid;

2) Fixed and removable alpha radiation survey of buildings;

3) Collection and gamma spectral analysis of process material (and mud pond sediments;

4) Preparation of report summarizing the findings of the survey.

During the course of this radiological survey, readily accessible drums or containers which exhibit elevated readings will be moved to an agreed upon on-site location to which access can be restricted. Based on the results of the survey, up to fifteen (15) containers (including the ones previously identified at the Site) which are characterized as low level radioactive waste will be removed for disposal.

3.3 Laboratory Chemicals

Small quantities of identifiable laboratory chemicals have already been secured and placed in overpacks. In addition, small quantities of unidentified laboratory chemicals remain in some areas. USEPA has recommended characterization, overpacking and disposal, as needed, for all the laboratory chemicals.

3.3.1 Proposed Action. The existing laboratory overpacks will be removed for disposal. The chemicals in existing overpacks may have to be redistributed and placed in special containers. All existing laboratory overpacks which can be removed, as is, by ENSCO (the contractor who completed the overpacking) to its disposal facility will be done. Any remaining laboratory overpacks will be repackaged and reinventoried by the selected disposal contractor. Any packing lists in compliance with the contractors packing guidelines will be spot checked for accuracy. The existing laboratory overpacks will be moved to a fully permitted transfer facility to await approval of the disposal site. The remaining unindentified laboratory chemicals will be characterized in the field. Up to 200 additional bottles, jars and/or containers will undergo a fingerprint analysis in an isolated area of the Site. This fingerprinting will be done under a portable fume hood. Based on these results, the chemicals will be appropriately packaged for off-site disposal.

3.4 Drum Inventory and Removal

USEPA has recommended the characterization and removal of drums containing chemicals (solid and liquid) at the Site. Specifically, USEPA referred to 50 to 100 units located in the Dickinson Warehouse area (northwest parcel).

3.4.1 Proposed Action. A number of drums containing liquids had been identified in the report prepared by RTP Environmental Associates, Inc. in May 1988. Based on the RTP report, approximately 108 drums of liquids were moved to inside the Dice Building (Main Facility Property). EPA's identification of 50 to 100 units (containers, drums, etc.) containing solid and liquids is in addition to the drums already placed in the Dice Building.

Based on this information, up to 250 drums of liquid/solid chemicals will be characterized for removal and disposal. The drummed contents will be screened for radioactivity in conjunction with the characterization for the purpose of bulking prior to detailed laboratory analysis for disposal. It is assumed that 125 drums will be characterized as waste water treatment candidates and 125 drums will be characterized as incineration candidates.

3.5 Tank Characterization

USEPA has recommended characterization of any liquids remaining in tanks at the Site. The purpose of this characterization would be to determine if the contents of any tank warrants immediate removal; to identify the types of materials present in different locations so that the appropriate emergency services units are aware of materials on-site; and, ultimately, to ascertain the most practical treatment and disposal options for these liquids.

3.5.1 Proposed Action. Currently, the only inventory of the tanks on the Site and their contents is in the RTP report. According to the report, this inventory was based on a review of records at the Site and a walk-through with a former employee of Li Tungsten. In many instances the tank size and contents (as of May 1988) is indicated. This information does not preclude the need for a more definitive characterization. To accomplish this, representative on-site testing for parameters, including but not limited to, RCRA characteristics, metals and screening for radioactive materials may be the most practical approach. A request for bid (RFB) for this characterization will be solicited (see schedule). The approach and methodology to be used for this characterization will be provided to the USEPA prior to implementation. The results of the characterization will serve to identify the nature of the materials in tanks, their location and evaluate further actions.

3.6 Asbestos

USEPA stated its concern with the presence of large quantities of asbestos in certain areas of the Site. These concerns previously involved worker exposure.

3.6.1 Proposed Action. An asbestos abatement/removal project is more consistent when a long-term remedial program is implemented at the Site. The major concern regarding asbestos is to on-site workers during field activities. Therefore, in order to protect workers, access to areas which are known to contain large quantities of friable asbestos (Lounge Building Area) will be limited. These areas will be designated on a Site map in the Health and Safety Plan. Additional protective gear will be used by personnel working in these areas. Consistent with OSHA requirements, HART will set up ambient air sampling for a specific time period in the vicinity of these areas to check whether fibers are being dispersed into the air stream. This work will be in addition to health and safety monitoring which will be implemented during the duration of on-site activities.

Two high volume air samples will be analyzed by phase contrast microscopy (PCM) to determine an eight hour time weighted average of asbestos concentration. PCM only determines the total number of fibers and does not distinguish between types of material. If OSHA standards are exceeded using PCM, another two air samples (taken at the same time) will be analyzed by transmission electron microscopy (TEM). In addition, between 25 to 50 bulk asbestos samples will be collected for analysis via polarized light microscopy with dispersion staining (PLMDS). Three to five samples will be collected of each homogeneous area and an estimate of the volume of material sampled, its percent asbestos, location and condition will be presented on a Site map.

3.7 <u>Creek Sediment Sampling</u>

USEPA has recommended that samples of sediment from the creek be obtained for analysis of appropriate radionuclides. The agency proposed these samples be obtained in the vicinity of the outfalls from the Site. According to available information, five (5) outfalls discharged from the Site to the creek when the facility operated. Therefore, five (5) sediment samples were requested.

3.7.1 <u>Proposed Action</u>. A creek sediment sampling program is premature and more in line with a long-term remedial study not a short, interim action. Nevertheless, five (5) creek sediment samples will be collected for radioactivity analysis only. The sampling and analysis will be done by personnel associated with New York University Medical Center, Institute of Environmental Medicine. The individuals will do the work as consultants to GCDC and not under the banner of the University. One sediment sample will be taken in the creek, east of the Site while three sediment samples will be collected in the vicinity of the outfalls and one sediment sample will be obtained from the western portion of the creek.

The samples will be placed in aluminum cans and assayed, (after one to two weeks), for gamma-emitting radionuclides (^{40}K, ^{137}Cs, ^{226}Ra-daughters, ^{228}Th-daughters and ^{228}Ra-daughters) using an intrinsic Ge detector. A portion of the sample will be removed and assayed radiochemically for ^{234}U, ^{238}U, ^{232}Th, ^{230}Th and ^{228}Th. Although the sample collection will be completed in a short period of time, the radionuclide analysis and report will require approximately 3 to 4 months.

3.8 <u>Transformer Inventory and Characterization</u>

USEPA has recommended the inventory of transformers at the Site and characterization of the oils inside the transformers. During its inspection, one transformer located outside a building on the main facility property appeared to have leaked onto the asphalt surface.

3.8.1 <u>Proposed Action</u>. HART has identified sixteen (16) transformers at the Site. The previous RTP report indicated twenty-one (21) transformers and two (2) oil circuit breakers. The contractor who completed the survey for RTP (Empire Environmental Services) will be contacted to account for these five (5) additional transformers and two (2) oil circuit breakers. In any event, a sample oil from the identified transformers will be collected for PCB analysis. Based on these analyses, arrangements for disposal and associated costs will be prepared.

3.9 <u>Mercury Clean-up</u>

An area inside the Benbow (Reduction) building was identified by the USEPA field reconnaisance team to have mercury on the floor. USEPA recommended this area be cleaned.

3.9.1 <u>Proposed Action</u>. Once the dimension of the area is defined, a field team in protective clothing will spread an absorbant lead based salt on the floor surface. The floor surface will be swept and the material placed in a plastic 55-gallon drum. All equipment used in the cleaning will also be placed in the drum. A representative sample (wipe or sweep) will be collected for mercury analysis after the clean-up is completed.

APPENDIX B

SCHEDULE OF COMPLIANCE

INTERIM ACTIONS
AT THE
LI TUNGSTEN SITE
63 HERB HILL ROAD
GLEN COVE, NEW YORK

Prepared by:

FRED C. HART ASSOCIATES, INC.
530 FIFTH AVENUE
NEW YORK, NEW YORK 10036-5166

July 17, 1989

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1.0 ESTIMATED SCHEDULE

An estimated schedule for the implementation of the interim actions described in this SOW is presented in Figure 2. The time lines include mobilization, field activities and necessary laboratory analysis. Footnotes for each of the listed items are also included. Although the estimated schedule indicates that work will start once an interim order is established, a number of items are ongoing or have already been completed. To the extent practical, interim actions wil be completed in short time frames.

HART will provide a bi-monthly status report to the USEPA which summarizes the on-going or completed activities and transmits relevant documentation. The recipients of these status reports are indicated in the order on consent.

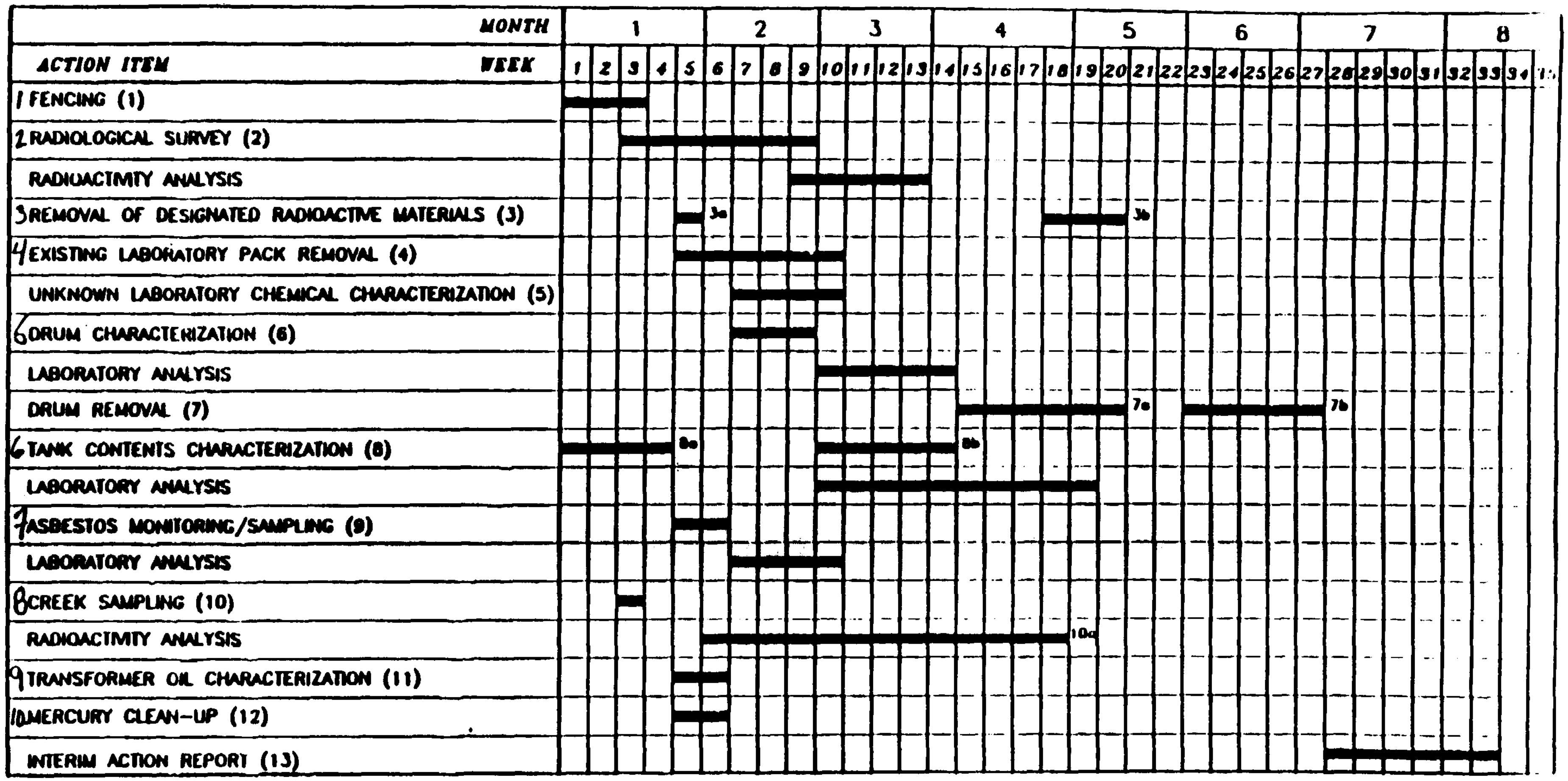


FIGURE 2

Estimated Schedule
Interim Actions at Li Tungsten

FRED C. HART ASSOCIATES, INC

100661

<u>Notes</u>:

* Start date coincides with interim order

1: Fencing is ongoing. Estimated completion is June 23rd. Security guards (one 24 hr. and one 8 hr.) are also provided at the Site.

2: Radiological survey to be conducted by the NDL Organization. Currently scheduled to begin the week of June 19, 1989.

3: Previously identified containers exhibiting elevated radioactivity readings will be staged in the wire plant. Once survey is completed, up to fifteen containers, characterized as low level radioactivity waste, will be removed from the Site.

3a: This time line reflects the staging of containers exhibiting elevated radioactivity levels in the wire plant building.

3b: This time line reflects removal of up to fifteen containers characterized as low level radioactive waste once laboratory analysis and disposal site arrangements are completed.

4: Initiation of laboratory pack removal to immediately follow radiological survey time frame allows for mobilization, random checking of packing inventories against drum contents, repackaging if necessary, and removal to appropriate staging or disposal facility.

5: Unknown laboratory chemical characterizations will be completed in an isolated area using a fume hood.

6: Drum characterization assumes a total of 250 drums (125 for waste water treatment analysis and 125 for incineration analysis).

7: Drum removal (see 6) to begin following receipt of detailed laboratory analysis.

7a: Time frame to review laboratory results of drums and arranging for appropriate disposal of up to 250 drums.

7b: Time frame to remove up to 250 drums to an approved disposal facility.

8: Tank contents characterization includes identifying which tanks contain liquids and their approximate volumes.

8a: Time frame to soliciting competitive bids, review and select contractor and notify USEPA prior to implementation.

8b: Time frame to complete the tank characterization.

9: Time frame, to monitor/sample for asbestos. Includes two high volume air samples and between 25 and 50 bulk samples for laboratory analysis.

10: Creek Sampling will be scheduled.

10a: Radionuclide analysis and reporting to be completed in approximately 3 months

11: Characterization of transformer oils to follow radiological survey.

12: Mercury on floor of Benbow Building to be cleaned.

13: Summary Report of completed Interim Actions.

REFERENCE NO. 26

530 Fifth Avenue, [illegible] York, NY 10036-5155 (212) 840-3990

Fred C. Hart Associates, Inc.

HART

[illegible]
[illegible]
Boston, MA
[illegible]
Detroit, MI
Stamford, CT
Irvine, CA
Jacksonville, FL
[illegible]
Pittsburgh, PA
Sacramento, CA
Washington, DC
[illegible]
West Chester, PA

September 21, 1989

Mr. Charles Fitzsimmons
Environmental Engineer-OSC
USEPA Region II
Woodbridge Avenue
Edison, New Jersey 08837

Re: Partial Laboratory Results of Air and Bulk Samples--Li Tungsten

Dear Mr. Fitzsimmons:

Enclosed are copies of the analytical results which have been received by HART. These include air samples for asbestos, metals and volatile organics from a number of indoor and outdoor sampling points at the Li Tungsten facility in Glen Cove.

The asbestos air results are contained on a single data sheet from Laboratory Testing Services These air samples were obtained from five locations, four of which were inside buildings. A summary sheet of the results of air samples for metals is attached to the laboratory date sheets. Also, a summary sheet for the air samples for volatile analysis is attached to the laboratory data sheets. These volatile air samples were obtained inside the laboratories on the main parcel (A). Where applicable, the TLV for a specific volatile compound is noted. The results of air samples for inorganic acid gases have not yet been received from the laboratory.

A total of 51 bulk samples were collected for analysis of asbestos containing materials. The results of this analysis including a description and map of the sample location is also in this package.

Sincerely,

James A. Perazzo
Associate-Manager of Geosciences

Asbestos Bulk Sampling Data - (06/26 - 06/27/89)

Number	Type	Analysis
ASB 1.	Trowelled on tank insulation	69% Chrysotile
ASB 2.	Black paper/fabric matrix behind ASB 1	5% Chrysotile
ASB 3.	Block material supported by wide mesh hanging from tank	45% Amosite
ASB 4.	Pipe insulation between tanks L9D and L9C	No asbestos detected (NAD)
ASB 5.	Pipe joint compounds on elbow (of ASB 4)	60% Chrysotile
ASB 6.	Floor dust (near APT)	NAD
ASB 7.	Stacked pipe insulation (preformed)	60% Amosite
ASB 8.	Hanging insulation on pipes (preformed)	60% Amosite
ASB 9.	Pipe insulation associated with Tank 85	30% Amosite 20% Chrysotile 2% Crocidolite
ASB 10.	Outside wall (block with flakes)	10% Chrysotile
ASB 11.	Wall board, 2nd level, northern section	NAD
ASB 12.	Trowelled on tank insulation above anhydrous tank	NAD
ASB 13.	Block material (same area as ASB 12)	NAD
ASB 14.	Wall material (east inner wall - along stairwell)	NAD
ASB 15.	Plasterboard from locker room - 2nd level	NAD
ASB 16.	Preformed block insulation, roof on locker room	20% Amosite 20% Chrysotile

Number	Type	Analysis
ASB 17.	White powder beneath overhead piping (same as ASB 16)	NAD
ASB 18.	Insulation on small furnace	25% Amosite 25% Chrysotile
ASB 19.	Plaster board particles - collapsed on floor	NAD
ASB 20.	Ceiling tile - collapsed on floor	NAD
ASB 21.	Pipe joint compound (1st lab from wire plant)	20% Amosite 35% Chrysotile 2% Crocidolite
ASB 22.	Solid insulation on pipe (same area as ASB 21)	30% Amosite 30% Chrysotile 15% Crocidolite
ASB 23.	Duplicate (of ASB 22)	25% Amosite 30% Chrysotile 5% Crocidolite
ASB 24.	Ceiling board (brown)	NAD
ASB 25.	Safe interior (insulation) debris on floor	NAD
ASB 26.	Pipe insulation in boiler room	25% Chrysotile
ASB 27.	Insulation debris fallen from overhead pipe rack	40% Amosite 15% Chrysotile
ASB 28.	Refractory cement spill on wet floor in machine shop	NAD
ASB 29.	Mineral wool (white boxes in machine shop)	NAD
ASB 30.	Pipe (overhead) insulation - preformed	35% Amosite 20% Chrysotile
ASB 31.	Outside coating on tank 35	30% Chrysotile
ASB 32.	Pipe (overhead) insulation between tank 35 and 36	NAD
ASB 33.	Refractory material on underside of furnace 105	NAD
ASB 34.	Refractory block - in drum, outside SW corner of Dice	<1% Amosite

(2173n-2)

Number	Type	Analysis
ASB 35.	Pipe insulation - dropped from overhead rack	<1% Chrysotile
ASB 36.	Wall board (just inside from stack)	NAD
ASB 37.	Insulation around flue coming out of stack area	80% Chrysotile 40% Amosite
ASB 38.	Troweled on cement (same as ASB 37)	45% Chrysotile
ASB 39.	Pipe insulation - inside boiler area	35% Amosite 20% Chrysotile
ASB 40.	Fibreboard, warehouse stack	NAD
ASB 41.	Refractory lining in furnace	NAD
ASB 42.	Pipe insulation stacked	40% Amosite 10% Chrysotile 5% Crocidolite
ASB 43.	Wall board - west wall	NAD
ASB 44.	Wall board - west wall	NAD
ASB 45.	Slag on floor	NAD
ASB 46.	Deteriorized wall board	NAD
ASB 47.	Deteriorized pipe insulation, fallen on ground - outside	NAD
ASB 48.	Pipe insulation in boiler room	30% Amosite 20% Chrysotile
ASB 49.	Corrugated fibreboard insulation on floor	2% Chrysotile
ASB 50.	Roof panel in corner office	NAD
ASB 51.	Preformed pipe insulation - white, on furnace	40% Amosite 30% Chrysotile

Applied
Environmental
Technology, Inc.

a subsidiary of WAVETECH inc.

316 Cooper Center
Pennsauken.N.J. 08109 (609) 486-9200

August 2, 1989

Hart Environmental
530 Fifth Avenue
New York, NY 10036

ATTEN: Karl Boldt

RE: Lab #: L070701
Project No. 00265-02-00035-01
Bulk Sample Analyses

Dear Mr. Boldt:

Applied Environmental Technology, Inc., located at 316 Cooper Center, Pennsauken, New Jersey, analyzed the following samples on June 29, 1989

DATA SUMMARY
BULK SAMPLE ANALYSIS

Sample No.	Sample Description	Approximate Percentage Asbestos Composition
1-8766-47	Trowled on tank Insulation	69% Chrysotile
2-8766-48	Black outer cover on tank	05% Chrysotile
3-8766-49	Insulation block on tank	45% Amosite
4-8766-50	Corrugated pipe insulation	No Asbestos Detected (NAD)
5-8766-51	Pipe joint	60% Chrysotile
6-8766-52	Floor dust	(NAD)
7-8766-53	Loose pipe insulation (pre-formed)	60% Amosite
8-8766-54	White (pre-formed) pipe insulation	60% Chrysotile

Applied
Environmental
Technology, Inc.

Sample No.	Sample Description	Approximate Percentage Asbestos Composition
9-8766-55	White (pre-formed) block insulation	30% Amosite 20% Chrysotile 02% Crocidolite
10-8766-56	Asphalt wall coating	10% Chrysotile
11-8766-57	Wallboard	(NAD)
12-8766-58	Trowled on tank insulation	(NAD)
13-8766-59	(Pre-formed) block insulation	(NAD)
14-8766-60	Wall plaster	(NAD)
15-8766-61	Plaster board	(NAD)
16-8766-62	(Pre-formed) block insulation	20% Amosite 20% Chrysotile
17-8766-63	Fallen white debris	(NAD)
18-8766-64	Furnace insulation	25% Amosite 25% Chrysotile
19-8766-65	Plaster board	(NAD)
20-8766-66	Ceiling tile	(NAD)
21-8766-67	Pipe insulation	20% Amosite 35% Chrysotile 02% Crocidolite
22-8766-68	Pipe insulation	30% Amosite 30% Chrysotile 15% Crocidolite
23-8766-69	Pipe insulation	25% Amosite 30% Chrysotile 05% Crocidolite

Applied Environmental Technology, Inc.

Sample No.	Sample Description	Approximate Percentage Asbestos Composition
24-8766-70	Cellulose wallboard	(NAD)
25-8766-71	Safe insulation	(NAD)
26-8766-72	Pipe insulation	25% Chrysotile
27-8766-73	Fallen white debris	40% Amosite 15% Chrysotile
28-8766-74	Refractory cement	(NAD)
29-8766-75	Mineral wool	(NAD)
30-8766-76	White (pre-formed) pipe insulation	35% Amosite 20% Chrysotile
31-8766-77	Tank coating	30% Chrysotile
32-8766-78	Pipe insulation	(NAD)
33-8766-79	Refractory	(NAD)
34-8766-80	Refractory debris	<1% Amosite
35-8766-81	Fallen debris (HH)	<1% Chrysotile
36-8766-82	Wall board	(NAD)
37-8766-83	White (pre-formed) insulation	20% Chrysotile 40% Amosite
38-8766-84	Trowled on cement	45% Chrysotile
39-8766-85	Pipe insulation	35% Amosite 20% Chrysotile
40-8766-86	Fiber board	(NAD)
41-8766-87	Refractory	(NAD)

Applied
Environmental
Technology, Inc.

Sample No.	Sample Description	Approximate Percentage Asbestos Composition
42-8766-88	White (pre-formed) insulation	40% Amosite 10% Chrysotile 05% Crocidolite
43-8766-89	Wall board	(NAD)
44-8766-90	Wall board	(NAD)
45-8766-91	Slag	(NAD)
46-8766-92	Deteriorated wall board	(NAD)
47-8766-93	Deteriorated insulation	(NAD)
48-8766-94	White (pre-formed) pipe insulation	30% Amosite 20% Chrysotile
49-8766-95	Corrugated pipe insulation	02% Chrysotile
50-8766-96	Roof panel	(NAD)
51-8766-97	White (pre-formed) pipe insulation	40% Amosite 30% Chrysotile

Applied
Environmental
Technology, Inc.

ANALYTICAL TECHNIQUES

Analyses of bulk samples are performed according to Environmental Protection Agency Interim Method 600/M4-82-020. Each bulk sample undergoes both a gross examination under low power magnification to establish the presence and percentage of fibrous and non- fibrous components, and an examination under high power magnification to provide positive identification of these fibrous and some non-fibrous components.

The first examination is performed with a stereo microscope and an external illuminator. Each bulk sample is emptied onto a weighing paper and examined for layering, homogeneity and the presence of fibrous and non-fibrous materials. An estimation of the percentage of each component relative to the whole sample is made.

The second examination is performed with a polarizing light microscope (PLM). A sub-sample of the bulk sample is selected at the conclusion of the first examination, mounted onto a slide, treated with a fluid having an appropriate index of refraction, and examined using the PLM. The polarizing light microscopy procedure identifies the characteristics of the sub-sample components with transmitted polarizing light, crossed polars, slightly uncrossed polars, crossed polars plus the first order red compensator, and the central stop dispersion staining objective. The observations obtained using the various techniques are used to identify fibrous and some non-fibrous components on the basis of morphology, sign of elongation, and refractive index/dispersion staining colors.

QUALITY CONTROL

The Industrial Hygiene Services Laboratory conducts general quality control procedures as recommended by the National Institute for Occupational Safety and Health, the Environmental Protection Agency and the American Industrial Hygiene Association.

Additionally, the laboratory is a successful participant in both the American Industrial Hygiene Association/National Institute for Occupational Safety and Health Proficiency Analytical Testing (PAT) Program (Identification Number 08104-001), and the Environmental Protection Agency/Research Triangle Park Bulk Asbestos Quality Assurance Program (Identification Number 2180).

Joseph Mandrino,
Managing Director

D.C. No.: E 0200

HART

Name: KARL BOLDT

Affiliation: F.C. HART ASSOC.

Phone: (212) 840-3990

Address: 530 FIFTH AVE. NEW YORK NY 10036

Client/Job No: 00265-02 00035-01

Job Name: LI TUNGSTEN Location: GLEN COVE, NY

CHAIN OF CUSTODY RECORD

Sample No.	Lab I.D. No.	Date	Time	Matrix	No. of Containers	Analysis Requested/Remarks
ASB 1	8766-47	6/26/89	1150	BULK	1	TROWELED-ON TANK INS.
ASB 2	8766-48					BLK. OUTER COVER ON TANK
ASB 3	8766-49					INS. BLOCK ON TANK
ASB 4	8766-50					CORRUGATED PIPE INS.
ASB 5	8766-51					PIPE JOINT INS.
ASB 6	8766-52					FLOOR DUST
ASB 7	8766-53					LOOSE PIPE INS. (PRE-FORMED
ASB 8	8766-54					WHITE PRE FORMED PIPE INS
ASB 9	8766-55					WHITE PRE-FORMED BLOCK INS.
ASB 10	8766-56					ASPHALT WALL COATING

Comments: ALL SAMPLES ANALYZED FOR ASBESTOS (PLM)

Relinquished by: Karl Boldt Date: 6/28/89 Shipment Method: FED EXP
Time: 5 PM Airbill No.: 9643707070

Received by: [signature] Date: 6-29-89 Relinquished by: ________ Date: ________
Time: 9:45 Am Time: ________

Received by: ________ Date: ________ Relinquished by: ________ Date: ________
Time: ________ Time: ________

Final Disposition of Samples: ________

Received by: ________ Date: ________ Time: ________

HART Form 400 Pink/Field Copy - Yellow/Lab Copy - White/Original - To be returned with results.

D.C. No.: E 0201

HART

Name: KARL BOLDT
Affiliation: F.C. HART ASSOC.
Phone: (212) 840-3990
Address: 530 FIFTH AVE., NEW YORK, NY, 10036
Client/Job No: 00265-02-00035-01
Job Name: LI TUNGSTEN Location: GLEN COVE, NY

CHAIN OF CUSTODY RECORD

Sample No.	Lab I.D. No.	Date	Time	Matrix	No. of Containers	Analysis Requested/Remarks
ASB 11	8766-57	6/26/89	1233	BULK	1	WALLBOARD
ASB 12	8766-58	↓	↓	↓	↓	TROWELED-ON TANK INS.
ASB 13	8766-59					PRE-FORMED BLOCK INS.
ASB 14	8766-60					WALL PLASTER
ASB 15	8766-61					PLASTER BOARD
ASB 16	8766-62					PRE-FORMED BLOCK INS.
ASB 17	8766-63					FALLEN WHITE DEBRIS
ASB 18	8766-64					FURNACE INS.
ASB 19	8766-65					PLASTER BOARD
ASB 20	8766-66	↓	↓	↓	↓	CEILING TILE

Comments: ALL SAMPLES ANALYZED FOR ASBESTOS

Relinquished by: Karl Boldt Date: 6/28/89 Shipment Method: FED EXP
Time: 5 PM Airbill No.: 9643704070

Received by: [illegible signature] Date: 6-29-89 Relinquished by: ______ Date: ______
Time: 9:45 AM Time: ______

Received by: ______ Date: ______ Relinquished by: ______ Date: ______
Time: ______ Time: ______

Final Disposition of Samples: ______

Received by: ______ Date: ______ Time: ______

HART Form 400 Pink/Field Copy - Yellow/Lab Copy - White/Original - To be returned with results.

D.C. No.: E 0202

HART

Name: KARL BOLDT
Affiliation: F.C. HART ASSOC
Phone: (212) 840-3990
Address: 530 FIFTH AVE, NEW YORK, NY 10036
Client/Job No: 00265-02-00035-01
Job Name: LI TUNGSTEN Location: GLEN COVE, NY

CHAIN OF CUSTODY RECORD

Sample No.	Lab I.D. No.	Date	Time	Matrix	No. of Containers	Analysis Requested/Remarks
ASB 21	5766-67	6/22/89	1350	BULK	1	PIPE INS.
ASB 22	5766-68					PIPE INS.
ASB 23	5766-69					PIPE INS,
ASB 24	5766-70					CELLULOSE WALLBOARD
ASB 25	5766-71		1612			SAFE INS.
ASB 26	5766-72					PIPE INS.
ASB 27	5766-73					FALLEN WHITE DEBRIS
ASB 28	5766-74					REFRACTORY CEMENT
ASB 29	5766-75					MINERAL WOOL
ASB 30	5766-76		1050			WHITE PRE-FORMED PIPE INS.

Comments: ALL SAMPLES ANALYZED FOR ASBESTOS

Relinquished by: Karl Boldt Date: 6/23/89 Shipment Method: FED EXP
Time: 5 PM Airbill No.: 9643704070

Received by: [illegible] Date: 6-24-89 Relinquished by: ______ Date: ______
Time: 9:45 Am Time: ______

Received by: ______ Date: ______ Relinquished by: ______ Date: ______
Time: ______ Time: ______

Final Disposition of Samples: ______

Received by: ______ Date: ______ Time: ______

HART Form 400 Pink/Field Copy - Yellow/Lab Copy - White/Original - To be returned with results.

D.C. No.: E 0203

HART

Name: KARL BOLDT
Affiliation: F.C. HART ASSOC
Phone: (212) 840-3790
Address: 530 FIFTH AVE. NEW YORK, NY 10036
Client/Job No: 00265-02-00035-01
Job Name: LI TUNGSTEN Location: GLEN COVE, NY

CHAIN OF CUSTODY RECORD

Sample No.	Lab I.D. No.	Date	Time	Matrix	No. of Containers	Analysis Requested/Remarks
ASB 31	8766-77	6/26/89	1650	BULK	1	TANK COATING
ASB 32	8766-78					PIPE INS. (FG)
ASB 33	8766-79					REFRACTORY
ASB 34	8766-80					REFRACTORY DEBRIS
ASB 35	8766-81					FALLEN DEBRIS (HH)
ASB 36	8766-82		1745			WALLBOARD
ASB 37	8766-83					WHITE PRE-FORMED INS ~~FALLEN DEBRIS (HH)~~
ASB 38	8766-84					TROWELED-ON CEMENT
ASB 39	8766-85					PIPE INS.
ASB 40	8766-86	6/27/89	1004			FIBERBOARD

Comments: ALL SAMPLES ANALYZED FOR ASBESTOS

Relinquished by: Karl Boldt Date: 6/28/89 Shipment Method: FED EXP
Time: 5 PM Airbill No.: 9643704070

Received by: [signature] Date: 6-29-89 Relinquished by: ____ Date: ____
Time: 9:45AM Time: ____

Received by: ____ Date: ____ Relinquished by: ____ Date: ____
Time: ____ Time: ____

Final Disposition of Samples: ____

Received by: ____ Date: ____ Time: ____

HART Form 400 **Pink/Field Copy - Yellow/Lab Copy - White/Original - To be returned with results.**

D.C. No.: E 0204

HART

Name: KARL BOLDT
Affiliation: F.C. HART ASSOC.
Phone: (212) 840-3990
Address: 530 FIFTH AVE, NEW YORK, NY 10036
Client/Job No: 00265-02-00035-01
Job Name: LI TUNGSTEN Location: GLEN COVE, NY

CHAIN OF CUSTODY RECORD

Sample No.	Lab I.D. No.	Date	Time	Matrix	No. of Containers	Analysis Requested/Remarks
ASB 41	8766-87	6/27/89	1003	BULK	1	REFRACTORY
ASB 42	8766-88					WHITE PRE-FORMED INS.
ASB 43	8766-89					WALLBOARD
ASB 44	8766-90					WALLBOARD
ASB 45	8766-91					SLAG
ASB 46	8766-92					DETERIORATED WALL BOARD
ASB 47	8766-93					DETERIORATED INS.
ASB 48	8766-94		1045			WHITE PRE-FORMED PIPE INS.
ASB 49	8766-95					CORRUGATED PIPE INS.
ASB 50	8766-96					ROOF PANEL

Comments: ALL SAMPLES ANALYZED FOR ASBESTOS

Relinquished by: Karl Boldt Date: 6/28/89 Shipment Method: FED EXP
Time: 5 PM Airbill No.: 9643704070

Received by: [signature] Date: 6-29-89 Relinquished by: ______ Date: ______
Time: 9:45 am Time: ______

Received by: ______ Date: ______ Relinquished by: ______ Date: ______
Time: ______ Time: ______

Final Disposition of Samples: ______

Received by: ______ Date: ______ Time: ______

HART Form 400 Pink/Field Copy - Yellow/Lab Copy - White/Original - To be returned with results.

D.C. No.: E 0205

HART

Name: KARL BOLDT

Affiliation: F. C. HART ASSOC.

Phone: (212) 840-3790

Address: 530 FIFTH AVE, NEW YORK, NY 10036

Client/Job No: 00265-02-00035-01

Job Name: LI TUNGSTEN Location: GLEN COVE, NY

CHAIN OF CUSTODY RECORD

Sample No.	Lab I.D. No.	Date	Time	Matrix	No. of Containers	Analysis Requested/Remarks
ASB 57	5766-97	6/27/89	1112	BULK	1	WHITE PRE-FORMED PIPE INS.

Comments: ALL SAMPLES ANALYZED FOR ASBESTOS

Relinquished by: Karl Boldt Date: 6/28/89 Shipment Method: FED EXP
Time: 5 PM Airbill No.: 7643704070

Received by: Steven Whown Date: 6-29-89 Relinquished by: ____ Date: ____
Time: 9:45 am Time: ____

Received by: ____ Date: ____ Relinquished by: ____ Date: ____
Time: ____ Time: ____

Final Disposition of Samples: ____

Received by: ____ Date: ____ Time: ____

HART Form 400 Pink/Field Copy - Yellow/Lab Copy - White/Original - To be returned with results.

100679

Project No.: 89-15969

Log In No.: 1874

P.O. No.: 00265-02-00003-01

Date: July 21, 1989

ANALYTICAL DATA REPORT PACKAGE
FOR

Fred C. Hart Assoc.

530 5th Avenue

New York, N.Y. 10036

Attn: Karl Goldt
Ref: Li Tungsten

SAMPLE IDENTIFICATION	LABORATORY NUMBER	TYPE OF SAMPLE	DATE AND TIME OF SAMPLE COLLECTION

SEE FOLLOWING PAGES FOR RESULTS

REPORT PREPARED BY:
PARAG K. SHAH, Ph. D.
ORGANIC LAB. MANAGER

WE CERTIFY THAT THIS REPORT IS A TRUE REPORT OF RESULTS OBTAINED FROM OUR TESTS OF THIS MATERIAL.

RESPECTFULLY SUBMITTED,
NYTEST ENVIRONMENTAL INC.

DOUGLAS SHEELEY
LABORATORY DIRECTOR

REMO GIGANTE
EXECUTIVE V.P.

bf

100680

SAMPLE NUMBER: VO

Contractor: NYTEST ENVIRONMENTAL INC.
Lab Sample ID No: N9-9558
Sample Matrix: TUBE
Data Release Authorized By.

Project No: 89-15969
Date Sample Received: 07/7/89

VOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: NA
Date Analyzed: 07/14/89
Conc/Dil Factor: 0.1 pH:
Percent Moisture (Not Decanted): NA

CAS Number		Total ug
74-87-3	Chloromethane	1.0 U
74-83-9	Bromomethane	1.0 U
75-01-4	Vinyl Chloride	1.0 U
75-00-3	Chloroethane	1.0 U
75-09-2	Methylene Chloride	0.6 B
67-64-1	Acetone	1.0 U
75-15-0	Carbon Disulfide	0.5 U
75-35-4	1,1-Dichloroethene	0.5 U
75-34-3	1,1-Dichloroethane	0.5 U
540-59-0	Total-1,2-Dichloroethene	0.5 U
67-66-3	Chloroform	0.5 U
107-06-2	1,2-Dichloroethane	0.5 U
78-93-3	2-Butanone	1.0 U
71-55-6	1,1,1-Trichloroethane	0.5 U
56-23-5	Carbon Tetrachloride	0.5 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	0.5 U

CAS Number		Total ug
79-34-5	1,1,2,2-Tetrachloroethane	0.5 U
78-87-5	1,2-Dichloropropane	0.5 U
10061-02-6	Trans-1,3-Dichloropropene	0.5 U
79-01-6	Trichloroethene	0.5 U
124-48-1	Dibromochloromethane	0.5 U
79-00-5	1,1,2-Trichloroethane	0.5 U
71-43-2	Benzene	0.5 U
10061-01-5	cis-1,3-Dichloropropene	0.5 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	0.5 U
591-78-6	2-Hexanone	1.0 U
108-10-1	4-Methyl-2-Pentanone	1.0 U
127-18-4	Tetrachloroethene	0.5 U
108-88-3	Toluene	0.5 U
108-90-7	Chlorobenzene	0.5 U
100-41-4	Ethylbenzene	0.5 U
100-42-5	Styrene	0.5 U
	Total Xylenes	0.5 U
	Total Dichlorobenzene	3.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U), based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

nytest environmental inc

ORGANICS ANALYSIS DATA SHEET

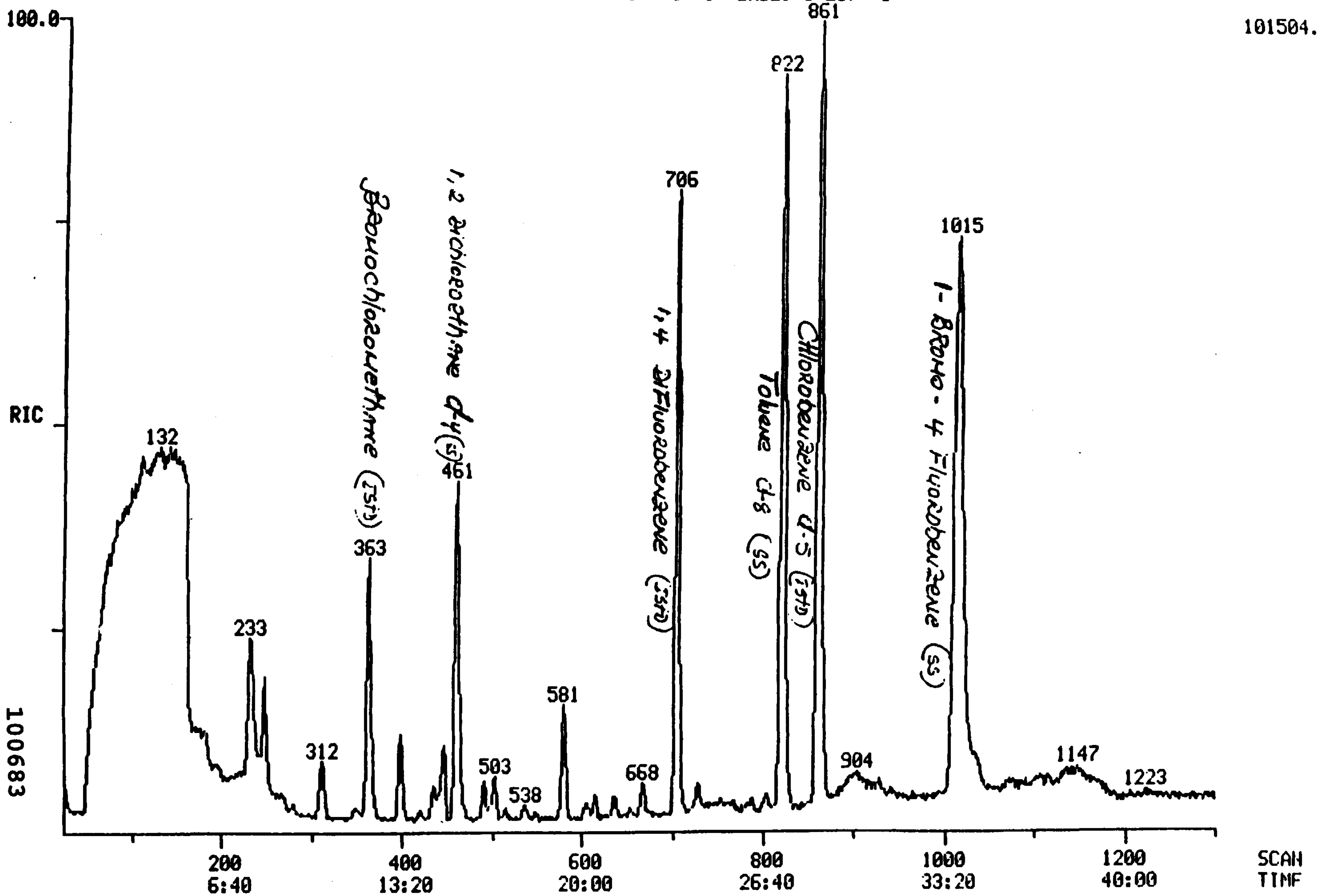
SAMPLE NUMBER: VOC-2
LAB SAMPLE ID NO: N9-9556

Contractor: NYTEST ENVIRONMENTAL INC.
Project No: 89-15969

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	RT	Total ug
1	UNKNOWN	VOA	2:46	6.2 J
2	UNKNOWN	VOA	3:18	12.5 J
3	UNKNOWN	VOA	3:44	14 J
4	UNKNOWN	VOA	4:16	8 J
5	UNKNOWN	VOA	4:24	4 J
6	UNKNOWN	VOA	4:42	8 J
7	UNKNOWN	VOA	4:54	7 J
8	UNKNOWN ACID	VOA	5:10	6 J
9	UNKNOWN	VOA	8:02	0.7 J
10	UNKNOWN	VOA	8:16	1.7 J
11	UNKNOWN	VOA	10:24	1 J
12	UNKNOWN	VOA	13:16	1.3 J
13	FREON	VOA	14:54	1.4 J
14	UNKNOWN	VOA	16:46	0.7 J
15	1,3-DIMETHYL 2,2-DIOLOXANE	VOA	19:22	1 J
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

RIC
07/14/89 10:48:00
DATA: D8945 #1070 SCANS 25 TO 1300
CALI: D8945 #2
SAMPLE: F.C.HART,VOC-2/N9-9558,REC'D 7/7/89
CONDS.: TUBE/2MLS,100UL/5ML INSTD
RANGE: G 1,1300 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3



Contractor: NYTEST ENVIRONMENTAL INC.
Lab Sample ID No: N9-9559
Sample Matrix: TUBE
Data Release Authorized By.

Project No: 89-15959
Date Sample Received: 07/7/89

VOLATILE COMPOUNDS

Concentration: Low **Medium** (Circle One)
Date Extracted/Prepared: NA
Date Analyzed: 07/14/89
Conc/Dil Factor: 0.1 pH:
Percent Moisture (Not Decanted): NA

CAS Number		Total ug
74-87-3	Chloromethane	1.0 U
74-83-9	Bromomethane	1.0 U
75-01-4	Vinyl Chloride	1.0 U
75-00-3	Chloroethane	1.0 U
75-09-2	Methylene Chloride	0.6
67-64-1	Acetone	1.0 U
75-15-0	Carbon Disulfide	0.5 U
75-35-4	1,1-Dichloroethene	0.5 U
75-34-3	1,1-Dichloroethane	0.5 U
540-59-0	Total-1,2-Dichloroethene	0.5 U
67-66-3	Chloroform	0.2 J
107-06-2	1,2-Dichloroethane	0.5 U
78-93-3	2-Butanone	1.0 U
71-55-6	1,1,1-Trichloroethane	0.3 J
56-23-5	Carbon Tetrachloride	0.1 J
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	0.5 U

CAS Number		Total ug
79-34-5	1,1,2,2-Tetrachloroethane	0.5 U
78-87-5	1,2-Dichloropropane	0.5 U
10061-02-6	Trans-1,3-Dichloropropene	0.5 U
79-01-6	Trichloroethene	0.5 U
124-48-1	Dibromochloromethane	0.5 U
79-00-5	1,1,2-Trichloroethane	0.5 U
71-43-2	Benzene	0.5 U
10061-01-5	cis-1,3-Dichloropropene	0.5 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	0.5 U
591-78-6	2-Hexanone	1.0 U
108-10-1	4-Methyl-2-Pentanone	1.0 U
127-18-4	Tetrachloroethene	0.5 U
108-88-3	Toluene	0.5 U
108-90-7	Chlorobenzene	0.5 U
100-41-4	Ethylbenzene	0.5 U
100-42-5	Styrene	0.5 U
	Total Xylenes	0.5 U
	Total Dichlorobenzene	3.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U), based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER: VOC-3
LAB SAMPLE ID NO: N9-5559

Contractor: NYTEST ENVIRONMENTAL INC.
Project No: 89-15969

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	RT	Total ug
1	UNKNOWN	VOA	2:54	3.7 J
2	UNKNOWN	VOA	3:34	2.3 J
3	UNKNOWN	VOA	6:04	4.6 J
4	TRICHLOROFLUOROMETHANE	VOA	10:20	1.9 J
5	2-METHYLBUTANE	VOA	14:28	0.8 J
6	FREON	VOA	14:50	1 J
7	UNKNOWN ALKANE	VOA	16:20	0.8 J
8	2,2-DIMETHYL 1,3-DIOLOXANE	VOA	19:20	1.6 J
9				
10				
11				
12				
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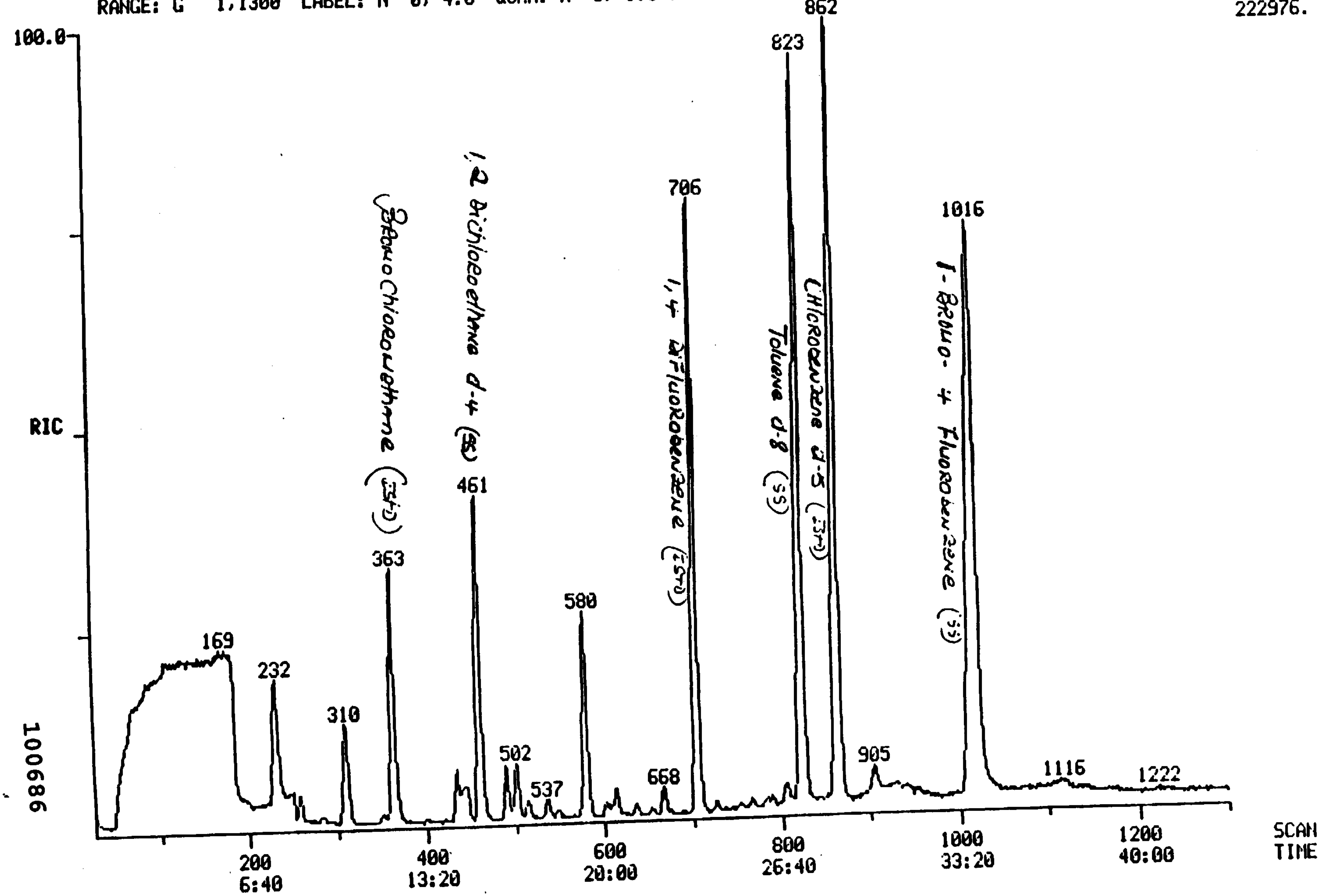
RIC
07/14/89 11:47:00
DATA: D8946 #1016
CALI: D8946 #2
SCANS 25 TO 1300
SAMPLE: F.C.HART,VOC-3/N9-9559,REC'D 7/7/89
CONDS.: TUBE/2MLS,100UL/5ML INSTD
RANGE: G 1,1300 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3



SAMPLE NUMBER: VOC-

Contractor: NYTEST ENVIRONMENTAL INC.
Lab Sample ID No: N9-9550
Sample Matrix: TUBE
Data Release Authorized By:

Project No: 89-15969
Date Sample Received: 07/7/89

VOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: NA
Date Analyzed: 07/14/89
Conc/Dil Factor: 0.1 pH:
Percent Moisture (Not Decanted): NA

CAS Number		Total ug
74-87-3	Chloromethane	1.0 U
74-83-9	Bromomethane	1.0 U
75-01-4	Vinyl Chloride	1.0 U
75-00-3	Chloroethane	1.0 U
75-09-2	Methylene Chloride	2.6
67-64-1	Acetone	1.0 U
75-15-0	Carbon Disulfide	0.5 U
75-35-4	1,1-Dichloroethene	0.5 U
75-34-3	1,1-Dichloroethane	0.5 U
540-59-0	Total-1,2-Dichloroethene	0.5 U
67-66-3	Chloroform	0.3 J
107-06-2	1,2-Dichloroethane	0.5 U
78-93-3	2-Butanone	1.0 U
71-55-6	1,1,1-Trichloroethane	0.3 J
56-23-5	Carbon Tetrachloride	0.2 J
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	0.5 U

CAS Number		Total ug
79-34-5	1,1,2,2-Tetrachloroethane	0.5 U
78-87-5	1,2-Dichloropropane	0.5 U
10061-02-6	Trans-1,3-Dichloropropene	0.5 U
79-01-6	Trichloroethene	0.5 U
124-48-1	Dibromochloromethane	0.5 U
79-00-5	1,1,2-Trichloroethane	0.5 U
71-43-2	Benzene	0.5 U
10061-01-5	cis-1,3-Dichloropropene	0.5 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	0.5 U
591-78-6	2-Hexanone	1.0 U
108-10-1	4-Methyl-2-Pentanone	1.0 U
127-18-4	Tetrachloroethene	0.5 U
108-88-3	Toluene	0.5 U
108-90-7	Chlorobenzene	0.5 U
100-41-4	Ethylbenzene	0.5 U
100-42-5	Styrene	0.5 U
	Total Xylenes	0.5 U
	Total Dichlorobenzene	3.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

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U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U), based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER: VOC-4
LAB SAMPLE ID NO: N9-9560

Contractor: NYTEST ENVIRONMENTAL INC.
Project No: 89-15969

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	RT	Total ug
1	UNKNOWN	VOA	3:02	7.1 J
2	UNKNOWN	VOA	3:14	0.7 J
3	UNKNOWN	VOA	3:36	7.1 J
4	UNKNOWN	VOA	4:08	4.4 J
5	UNKNOWN	VOA	4:18	2.0 J
6	UNKNOWN	VOA	4:32	5.5 J
7	TRICHLOROFLUOROMETHANE	VOA	10:18	4.7 J
8	UNKNOWN ALKANE	VOA	16:22	1.4 J
9	2,2-DIMETHYL 1,3-DIOXOLANE	VOA	19:18	1.7 J
10				
11				
12				
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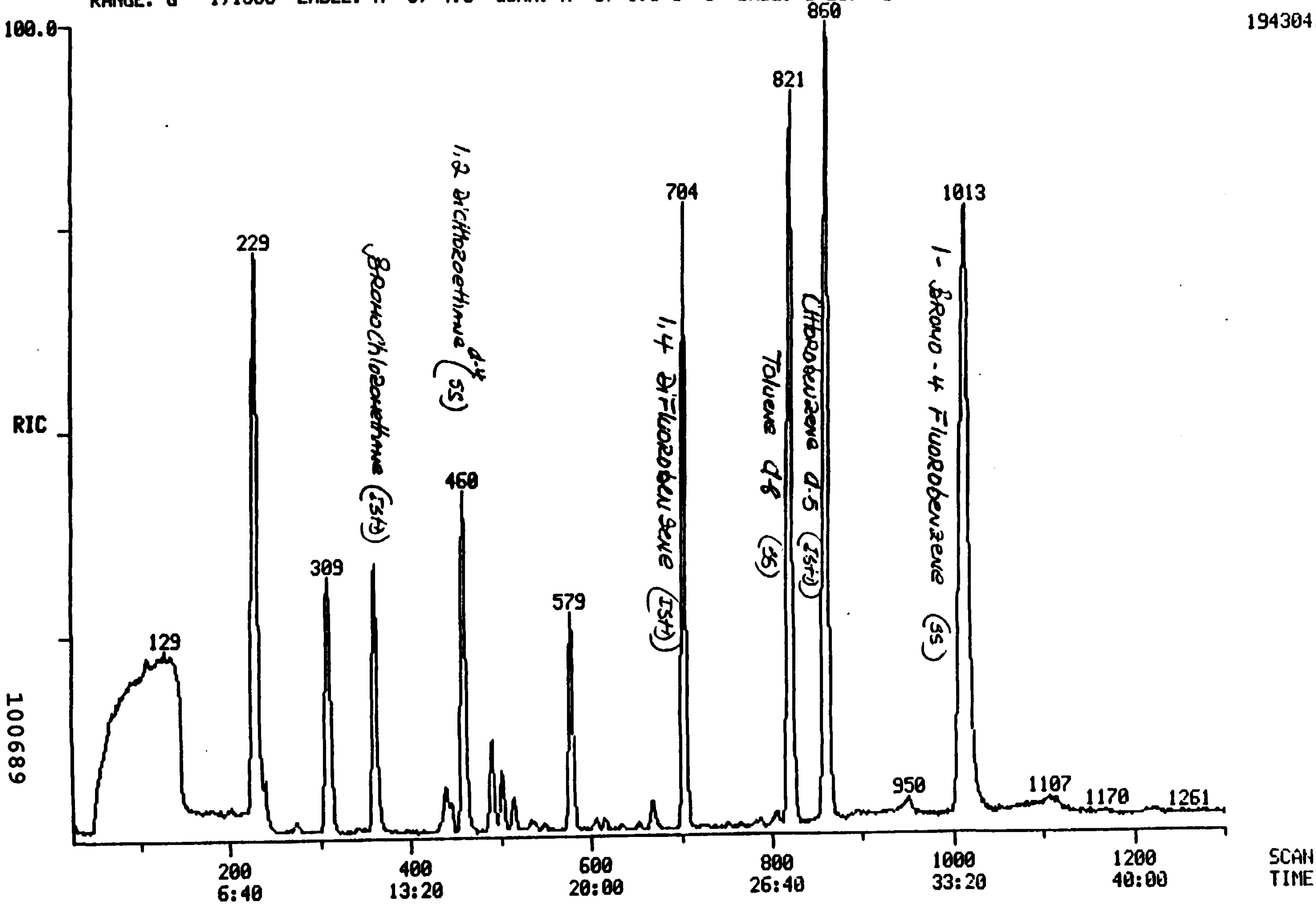
25				
26				
27				
28				
29				
30				

..IC DAT D89 101 SCANS 25 TO 800
07 1/89 12:46:00 CALI: D8947 #2
SAMPLE: FRED C.HART,VOC-4/N9-9560,REC'D 7/7/89,LOGIN 16/4
CONDS.: TUBE/2MLS,100UL/5ML INSTD
RANGE: G 1,1300 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3



J.C. No.: E 0221

HART

Name: KARL BOLDT

Affiliation: ~~HART~~ ~~[illegible]~~ FRED C. HART ASSOC., INC.

Phone: 530 FIFTH AVE. (212) 840-3990

Address: NEW YORK NY 10036

Client/Job No: 00265-02-00003-01

Job Name: LI TUNGSTEN Location: GLEN COVE, NY

CHAIN OF CUSTODY RECORD

Sample No.	Lab I.D. No.	Date	Time	Matrix	No. of Containers	Analysis Requested/Remarks
IOA-2		7/7/89	4 PM	SORBENT TUBE	1	INORGANIC ACIDS NIOSH METHOD 7300
IOA-3						
IOA-4						
VOC-2						VOCs NEI METHOD
VOC-3						
VOC-4						

Comments:

Relinquished by: Karl Boldt Date: 7/7/89 Shipment Method: By Hand

Time: 5 PM Airbill No.:

Received by: [illegible signature] Date: 7/7/89 Relinquished by: Date:

Time: 5 PM Time:

Received by: Date: Relinquished by: Date:

Time: Time:

Final Disposition of Samples:

Received by: Date: Time:

HART Form 400 Pink/Field Copy - Yellow/Lab Copy - White/Original - To be returned with results. . . .

100690

nytest environmental inc

ORGANIC DATA REPORTING QUALIFIERS

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detected limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g.: If limit of detection is 10 ug/l and a concentration of 3 ug/l is calculated, report as 3J.)

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

D This flag indentifies all compounds indentified in an analysis at a secondary dilution factor.

Note: Data on soil samples expressed on a dry weight basis.

SUMMARY OF METALS CONCENTRATION

Concentrations in ug/m^3

	ICP-1 Outdoors	ICP-2 Dice Bldg. Near Drums	ICP-3 Dice Bldg. Slag Pile	ICP-4 Warehouse	ICP-5 Benbow Bldg.	ICP-B Blank*	ACGIH TLV
Cadmium	<0.01	<0.01	<0.01	<0.01	0.06	<0.01	50
Copper	0.05	0.09	0.12	0.06	0.07	0.02	1,000
Chromium	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	500
Iron	0.18	22.17**	0.45	1.56	4.06	0.36	—
Nickel	<0.01	0.06	0.05	<0.01	0.11	<0.01	1,000
Zinc	0.15	0.14	<0.01	0.12	0.35	0.10	—
Lead	<0.15	<0.15	<0.15	<0.15	<0.15	<0.005	150
Silver	<0.01	0.76	<0.01	<0.01	<0.01	<0.01	100
Sodium	<0.01	1.97	<0.01	<0.01	<0.01	1.26	—
Aluminum	0.50	0.15	0.28	0.64	1.79	0.25	10,000
Manganese	<0.01	<0.01	<0.01	<0.01	2.83	0.09	5,000
Arsenic	<0.01	<0.01	<0.01	<0.01	<0.01	<0.50	200
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.0
Molybdenum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5,000
Phosphorus	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	100
Platinum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1,000
Selenium	0.13	<0.01	<0.01	0.12	<0.01	<0.50	200
Tellurium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	100
Thallium	0.56	0.02	<0.01	<0.01	<0.01	0.03	100
Tin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2,000
Titanium	0.22	<0.01	<0.01	<0.01	<0.01	<0.01	10,000
Vanadium	<0.01	0.04	0.01	0.07	0.19	0.18	50
Yttrium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1,000
Zirconium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5,000

* units are ug/g.

** this elevated value is believed to have been caused by a particle of rust scale from the drums that had fallen on the filter during sampling.

Volumetric Techniques, LTD.

317 Bernice Drive • Bayport, New York 11705 • (516) 472-4848

To: Laboratory Testing Services
75 Urban Avenue
Westbury NY 11590
334-7004

Date:
Collected:
Received :07/05/89
Completed:08/10/89
Reported By:

Sample Taken By
Client

Additional Lab No.:

Sample:H.L. Hart Associates
7300 Series (1 C R-1)
NY
334-7004

Sample Number 88898907

Parameters	Results mg/L	Parameters	Results mg/L
Cadmium	<0.01		
Copper	0.05		
Chromium, Total	<0.01		
Iron	0.10		
Nickel	0.01		
Zinc	0.15		
Lead	<0.15		
Silver	<0.01		
Sodium	<0.01		
Aluminum	0.50		
Manganese	<0.01		
Arsenic	<0.01		
Beryllium	<0.01		
Molybdenum	<0.01		
Phosphorus	<0.01		
Platinum	<0.01		
Selenium	0.13		
Tellurium	<0.01		
Thallium	0.56		
Tin	<0.01		
Titanium	0.22		
Vanadium	<0.01		
Yttrium	<0.01		
Zirconium	0.01		

Run Time : 24 Hours
Pump Rate : 1.26 L/M

Comments

• CONSULTING CHEMISTS • COMPLETE LABORATORY TESTING •
•Sander R. Sternig•Director of Laboratories•

...olumetric Techniques, LTD.

317 Bernice Drive • Bayport, New York 11705 • (516) 472-4848

To: Laboratory Testing Services
75 Urban Avenue
Westbury NY 11590
334-7004

Date:
Collected:
Received :07/05/89
Completed:08/10/89

Sample Taken By
Client

Reported By:

Additional Lab No.:

Sample: F.C. Hart Associates
7300 Series (I C P-2)
NY
334-7004

Sample Number 88918907

Parameters	Results mg/L	Parameters	Results mg/L
Cadmium	<0.01		
Copper	0.07		
Chromium, Total	<0.01		
Iron	22.17		
Nickel	0.06		
Zinc	0.14		
Lead	0.15		
Silver	0.76		
Sodium	1.97		
Aluminum	0.15		
Manganese	<0.01		
Arsenic	<0.01		
Beryllium	<0.01		
Molybdenum	<0.01		
Phosphorus	<0.01		
Platinum	<0.01		
Selenium	<0.01		
Tellurium	<0.01		
Thallium	0.02		
Tin	<0.01		
Titanium	<0.01		
Vanadium	0.04		
Yttrium	0.01		
Zirconium	<0.01		

Run Time : 24:05 Hrs
Pump Rate : 1.183 L/M

Comments

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Volumetric Techniques, LTD.

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To: Laboratory Testing Services
75 Urban Avenue
Westbury NY 11590
334-7004

Date:
Collected:
Received :07/05/89
Completed:08/10/89
Reported By:
Additional Lab No.:

Sample Taken By
Client

Sample: F.C. Hart Associates
7300 Series (J C P-3)
NY
334 7004

Sample Number 88938907

Parameters	Results mg/L	Parameters	Results mg/L
Cadmium	<0.01		
Copper	[illegible]		
Chromium, Total	<0.01		
Iron	0.45		
Nickel	0.05		
Zinc	<0.01		
Lead	<0.15		
Silver	<0.01		
Sodium	<0.01		
Aluminum	0.29		
Manganese	<0.01		
Arsenic	<0.01		
Beryllium	<0.01		
Molybdenum	<0.01		
Phosphorus	0.01		
Platinum	<0.01		
Selenium	<0.01		
Tellurium	<0.01		
Thallium	<0.01		
Tin	<0.01		
Titanium	<0.01		
Vanadium	0.01		
Yttrium	<0.01		
Zirconium	<0.01		

Run Time : 24 Hours
Pump Rate : 1.1764 L/M

Comments

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To:Laboratory Testing Services
75 Urban Avenue
Westbury NY 11590
334-7004

Date:
Collected:
Received :07/05/89
Completed:08/10/89
Reported By:

Additional Lab No.:

Sample Taken By
Client

Sample:F.C. Hart Associates
7720 Series (I C P-4)
NY
334-7004

Sample Number 88948907

Parameters	Results mg/L	Parameters	Results mg/L
Cadmium	<0.01		
Copper	0.06		
Chromium, Total	<0.01		
Iron	1.56		
Nickel	<0.01		
Zinc	0.12		
Lead	<0.15		
Silver	<0.01		
Sodium	<0.01		
Aluminum	0.64		
Manganese	<0.01		
Arsenic	<0.01		
Beryllium	<0.01		
Molybdenum	<0.01		
Phosphorus	<0.01		
Platinum	<0.01		
Selenium	0.12		
Tellurium	<0.01		
Thallium	<0.01		
Tin	<0.01		
Titanium	0.01		
Vanadium	0.07		
Yttrium	<0.01		
Zirconium	<0.01		

Run Time : 23:35 Hrs
Pump Rate : 0.900 L/M

Comments

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317 Sernice Drive • Bayport, New York 11705 • (516) 472-4848

[illegible] Testing Services
[illegible] Avenue
Westbury, NY 11590
[illegible]-7004

Sample Taken By
Client

Date:
Collected:
Received :07/05/89
Completed:08/10/89
Reported By:

Additional Lab No.:

Sample Number 88968907

Sample:F.C. Hart Associates
7300 Series (F.C. F-Blank)
NY
[illegible]4-7004

Parameters	Results ppm	Parameters	Results ppm
Cadmium	0.01		
Copper	0.02		
Chromium, Total	0.03		
Iron	0.36		
Nickel	0.01		
Zinc	0.10		
Lead	0.005		
Silver	0.01		
Sodium	1.26		
Aluminum	0.25		
Manganese	0.09		
Arsenic	0.50		
Beryllium	0.01		
Molybdenum	0.01		
Phosphorus	0.01		
Platinum	0.01		
Selenium	0.50		
Tellurium	0.01		
Thallium	0.03		
Tin	0.01		
Titanium	0.01		
Vanadium	0.18		
Yttrium	0.01		
Zirconium	0.01		

Comments
* Record For Blank : Not Mailed

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•Sander R. Sternig•Director of Laboratories•

D.C. No.: E 0206

HART

Name: KARL BOLDT

Affiliation: F. C. HART ASSOC.

~~Phone~~ Address: 530 FIFTH AVE. NEW YORK, NY 10036

~~Address~~ Phone: (212) 840-3990

Client/Job No: 00265-02-00035-01

Job Name: LI TUNGSTEN Location: GLEN COVE, NY

CHAIN OF CUSTODY RECORD

Sample No.	Lab I.D. No.	Date	Time	Matrix	No. of Containers	Analysis Requested/Remarks
TEM 1		6/26/89		FILTER	1	ASBESTOS (TEM)
TEM 2		↓		↓	↓	↓
TEM 3		↓				
TEM 4		6/27/89				
TEM 5		↓				↓
ICP 1		6/26/89				METALS (ICP) NIOSH 7300
ICP 2		↓				↓
ICP 3		↓				
ICP 4		6/27/89				
ICP 5		↓		↓	↓	↓

Comments: DETECTION LIMIT OF 1 µg NECESSARY FOR ICP METALS, PER NIOSH METHOD 7300.

Relinquished by: Karl Boldt Date: 6/28/89 Shipment Method: FED EXP
Time: 5 PM Airbill No.: 9643704081

Received by: ______ Date: ______ Relinquished by: ______ Date: ______
Time: ______ Time: ______

Received by: ______ Date: ______ Relinquished by: ______ Date: ______
Time: ______ Time: ______

Final Disposition of Samples: ______

Received by: ______ Date: ______ Time: ______

HART Form 400 Pink/Field Copy - Yellow/Lab Copy - White/Original - To be returned with results.

100698

D.C. No.: E   UCUI

HART

Name: KARL BOLDT
Affiliation: F. C. HART ASSOC.
Phone: (212) 840-3990
Address: 530 FIFTH AVE, NEW YORK, NY 10036
Client/Job No: 00265-02-00035-01
Job Name: LI TUNGSTEN   Location: GLEN COVE, NY

CHAIN OF CUSTODY RECORD

Sample No.	Lab I.D. No.	Date	Time	Matrix	No. of Containers	Analysis Requested/Remarks
ICPB		6/27/89		FILTER	1	METALS (ICP) NIOSH 7300

Comments: DETECTION LIMIT OF 1 Mg NECESSARY FOR ICP METALS, PER NIOSH METHOD 7300

Relinquished by: Karl Boldt Date: 6/28/89 Shipment Method: FED EXP
Time: 5PM Airbill No.: 9643704081

Received by: ______ Date: ______ Relinquished by: ______ Date: ______
Time: ______ Time: ______

Received by: ______ Date: ______ Relinquished by: ______ Date: ______
Time: ______ Time: ______

Final Disposition of Samples: ______

Received by: ______ Date: ______ Time: ______

100699

Laboratory Testing Services

RESULTS - continued:

TEM RESULTS SUMMARY FORM

PROJECT NAME: 00265-02-00035-01 DATE: July 7, 1989

CLIENT: Fred C. Hart Associates PROJECT NO.:

ATTENTION: Karl Boldt LAB. NO.: 89-02534

SAMPLING AGENCY: Fred C. Hart Associates

SAMPLING SITE: Li Tungsten, Glen Cove, New York

SAMPLING DATE: June 26, 1989-June 27, 1989 NO. OF SAMPLES SUBMITTED: Five (5)

RESULTS:

Sample	LTS ID#	Sample Volume (liters)	Sensitivity (Structures/cm^3)	Filter Concentration (Structures/mm^2)	Air Concentration (Structures/cm^3)
01	T-00304	1170	0.0047	<14.29	<0.0047
02	T-00305	936	0.0049	<11.90	<0.0049
03	T-00306	1058	0.0047	12.99	0.0047
04	T-00307	933	0.0049	<11.90	<0.0049
05	T-00308	904	0.0051	11.90	0.0051

< = LESS THAN

Transmission electron microscopy analysis was conducted in accordance with the analytical procedures described in 40 CFR Part 763 appendix A to subpart E.

Edward R D Smith

ANALYST(S)

Mark Young PhD

MARK YOUNG
TEM DIRECTOR

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100700

Laboratory Testing Services

LAB. NO.: 89-02534

REPORT OF TRANSMISSION ELECTRON MICROSCOPY TESTS FOR

AIRBORNE ASBESTOS FIBER DETERMINATION FOR

F.C. HART ASSOCIATES

530 5th STREET
NEW YORK, NEW YORK 10036

JULY 7, 1989

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boratory Testing Services

LAB. NO.: 89-02534

CLIENT: Fred C. Hart Associates
530 5th Street
New York, New York 10036
Attention: Karl Boldt

MATERIAL: Room Air

CLIENT'S ORDER NO.: 20663

TEST FOR: Detection and Identification of suspected Asbestos in Five (5) air samples as determined by Transmission Electron Microscopy (TEM) with Selected Area Electron Diffraction (SAED) and Energy Dispersive X-Ray Microanalysis (EDX).

---

0 BACKGROUND:

F.C. Hart Associates, Inc. collected five (5) air samples for airborne asbestos fiber determination at Li Tungsten, Glen Cove, New York. The samples were received on June 19, 1989.

2.0 PROCEDURE:

Transmission Electron Microscopy (TEM) with Selected Area Electron Diffraction (SAED) and Energy Dispersive X-Ray Microanalysis (EDX) were employed to detect and identify suspected asbestos in the above referenced air samples. The analytical method was conducted in accordance with analytical procedures described in 40 CFR Part 763 Appendix A to Subpart E.

100702

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LAB. NO.: 89-02534

3.0 APPLICABLE QUALIFICATIONS:

Laboratory Testing Services, Inc. maintains an interim accreditation for Transmission Electron Microscopy by the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP Identification #10837).

Laboratory Testing Services, Inc. is an American Industrial Hygiene Association accredited (#333) laboratory.

4.0 RESULTS:

Enclosed are an electron micrograph, selected area electron diffraction pattern, and elemental composition report of a representative chrysotile and non-asbestos structure.

The following results were obtained:

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laboratory testing services

RESULTS - continued:

TEM RESULTS SUMMARY FORM

PROJECT NAME: 00265-02-00035-01

DATE: July 7, 1989

CLIENT: Fred C. Hart Associates

PROJECT NO.:

ATTENTION: Karl Boldt

LAB. NO.: 89-02534

SAMPLING AGENCY: Fred C. Hart Associates

SAMPLING SITE: Li Tungsten, Glen Cove, New York

SAMPLING DATE: June 26, 1989-June 27, 1989

NO. OF SAMPLES SUBMITTED: Five (5)

RESULTS:

Sample	LTS ID#	Sample Volume (liters)	Sensitivity (Structures/cm^3)	Filter Concentration (Structures/mm^2)	Air Concentration (Structures/cm^3)
01	T-00304	1170	0.0047	<14.29	<0.0047
02	T-00305	936	0.0049	<11.90	<0.0049
03	T-00306	1058	0.0047	12.99	0.0047
04	T-00307	933	0.0049	<11.90	<0.0049
05	T-00308	904	0.0051	11.90	0.0051

< = LESS THAN
Transmission electron microscopy analysis was conducted in accordance with the analytical procedures described in 40 CFR Part 763 appendix A to subpart E.

Edward R. D. [illegible]
ANALYST(S)

MARK YOUNG Ph.D.
TEM DIRECTOR

100704

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LAB. NO.: 89-02534

5.0 DISCUSSION OF RESULTS:

The Occupational Safety and Health Administration (OSHA) has established standards for airborne asbestos fiber concentrations in an occupational environment. The permissible exposure level (PEL) based on an eight hour Time Weighted Average (TWA) is 0.2 fibers per cubic centimeter (f/cc) of air. According to the standard, the employer shall ensure that no employee is exposed to an airborne asbestos fiber concentration above the PEL.

Additionally, OSHA has established a TWA action level of 0.1 asbestos f/cc. Asbestos air concentrations at or above the action level require the employer initiate procedures to peridically monitor employee exposure.

New York State has established an air concentration of 0.01 f/cc as an acceptable clearance level for post abatement air quality. In "Guidance for Controlling Asbestos-Containing Materials in Buildings" as measured by Transmission Electron Microscopy (TEM), 0.005 f/cc has been referenced as a typical outdoor ambient airborne asbestos concentration in urban areas (Chatfield, 1983). It would be impractical to expect indoor air asbestos concentrations to be less than outdoor concentrations. Therefore, outdoor levels would appear to be the most appropriate baseline for comparison to indoor concentrations.

It must be noted that air monitoring measures only current conditions and provides no information about fiber release potential and future air levels. The EPA recommends a building survey be conducted to evaluate the degree of risk from asbestos-containing materials in buildings.

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LAB. NO: 89-02534

6.0 CERTIFICATION AND SIGNATURES:

We certify this report is a true and authentic report of results obtained from our tests.

Respectfully submitted,

LABORATORY TESTING SERVICES, INC.

Brian Heneveld
Vice President

David C. Harvey
President

CS

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LAB NO: 89-02534

APPENDIX A

RESULTS OF TEM ANALYSIS

100707

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Laboratory Testing Services

RESULT SHEET FOR TEM ASBESTOS AIR SAMPLE

CLIENT: Fred C. Hart Associates

DATE: July 7, 1989

SAMPLE NO.: 01

LTS NO.: T-00304

NO. OF GRID OPENINGS ANALYZED: 10

LAB. NO.: 89-02534

AVG. GRID OPENING AREA: 0.0070 mm^2

VOLUME: 1170 liters

TOTAL AREA ANALYZED: 0.070 mm^2

SENSITIVITY: 0.0047 Structure/cm^3

MANUFACTURER: Nucleopore

FILTER SIZE: 385 mm^2

LOT NO.: 81C3A/710/A8

COMPOSITION: Polycarbonate (.4um)

TOTAL NUMBER OF STRUCTURES: 8

TOTAL NUMBER OF ASBESTOS STRUCTURES: 0

MICROGRAPH #'S 1101-1102

STRUCTURE CLASSIFICATION

1) CHRYSOTILE STRUCTURES
   FIBERS 0 BUNDLES 0 CLUSTERS 0 MATRICES 0 TOTAL 0

2) AMPHIBOLE STRUCTURES
   FIBERS 0 BUNDLES 0 CLUSTERS 0 MATRICES 0 TOTAL 0

3) NON-ASBESTOS STRUCTURES
   FIBERS 7 BUNDLES 0 CLUSTERS 0 MATRICES 1 TOTAL 8

	.5< STRUCTURES <5um	>5um	TOTAL
ASBESTOS CONC. ON FILTER (STRUCTURES/mm^2)	--	--	<14.29
ASBESTOS CONC. IN AIR (STRUCTURES/cm^3)	--	--	<0.0047

(A1)

100708

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RESULT SHEET FOR TEM ASBESTOS AIR SAMPLE

CLIENT: Fred C. Hart Associates

DATE: July 7, 1989

SAMPLE NO.: 02

LTS NO.: T-00305

NO. OF GRID OPENINGS ANALYZED: 12

LAB. NO.: 89-02534

AVG. GRID OPENING AREA: 0.0070 mm^2

VOLUME: 936 liters

TOTAL AREA ANALYZED: 0.084 mm^2

SENSITIVITY: 0.0049 Structure/cm^3

MANUFACTURER: Nucleopore

FILTER SIZE: 385 mm^2

LOT NO.: 81C3A/710/A8

COMPOSITION: Polycarbonate (.4um)

TOTAL NUMBER OF STRUCTURES: 16

TOTAL NUMBER OF ASBESTOS STRUCTURES: 0

:CROGRAPH #'S: 1103-1104

STRUCTURE CLASSIFICATION

1) CHRYSOTILE STRUCTURES
   FIBERS 0 BUNDLES 0 CLUSTERS 0 MATRICES 0 TOTAL 0

2) AMPHIBOLE STRUCTURES
   FIBERS 0 BUNDLES 0 CLUSTERS 0 MATRICES 0 TOTAL 0

3) NON-ASBESTOS STRUCTURES
   FIBERS 13 BUNDLES 0 CLUSTERS 1 MATRICES 2 TOTAL 16

	.5< STRUCTURES <5um	>5um	TOTAL
ASBESTOS CONC. ON FILTER (STRUCTURES/mm^2)	--	--	<11.90
ASBESTOS CONC. IN AIR (STRUCTURES/cm^3)	--	--	<0.0049

(A2)

100709

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RESULT SHEET FOR TEM ASBESTOS AIR SAMPLE

CLIENT: Fred C. Hart Associates
DATE: July 7, 1989

SAMPLE NO.: 03
LTS NO.: T-00306

NO. OF GRID OPENINGS ANALYZED: 11
LAB. NO.: 89-02534

AVG. GRID OPENING AREA: 0.0070 mm^2
VOLUME: 1058 liters

TOTAL AREA ANALYZED: 0.077 mm^2
SENSITIVITY: 0.0047 Structure/cm^3

MANUFACTURER: Nucleopore
FILTER SIZE: 385 mm^2

LOT NO.: 81C3A/710/A8
COMPOSITION: Polycarbonate (.4um)

TOTAL NUMBER OF STRUCTURES: 8

TOTAL NUMBER OF ASBESTOS STRUCTURES: 1

ICROGRAPH #'S 1105-1108

STRUCTURE CLASSIFICATION

1) CHRYSOTILE STRUCTURES
   FIBERS 1 BUNDLES 0 CLUSTERS 0 MATRICES 0 TOTAL 1

2) AMPHIBOLE STRUCTURES
   FIBERS 0 BUNDLES 0 CLUSTERS 0 MATRICES 0 TOTAL 0

3) NON-ASBESTOS STRUCTURES
   FIBERS 4 BUNDLES 0 CLUSTERS 1 MATRICES 2 TOTAL 7

	.5< STRUCTURES <5um	>5um	TOTAL
ASBESTOS CONC. ON FILTER (STRUCTURES/mm^2)	12.99	--	12.99
ASBESTOS CONC. IN AIR (STRUCTURES/cm^3)	0.0047	--	0.0047

(A3)

100710

Laboratory Testing Services

RESULT SHEET FOR TEM ASBESTOS AIR SAMPLE

CLIENT: Fred C. Hart Associates

DATE: July 7, 1989

SAMPLE NO.: 04

LTS NO.: T-00307

NO. OF GRID OPENINGS ANALYZED: 12

LAB. NO.: 89-02534

AVG. GRID OPENING AREA: 0.0070 mm^2

VOLUME: 933 liters

TOTAL AREA ANALYZED: 0.084 mm^2

SENSITIVITY: 0.0049 Structure/cm^3

MANUFACTURER: Nucleopore

FILTER SIZE: 385 mm^2

LOT NO.: 81C3A/710/A8

COMPOSITION: Polycarbonate (.4um)

TOTAL NUMBER OF STRUCTURES: 15

TOTAL NUMBER OF ASBESTOS STRUCTURES: 0

MICROGRAPH #'S 1109-1110

STRUCTURE CLASSIFICATION

1) CHRYSOTILE STRUCTURES
   FIBERS 0 BUNDLES 0 CLUSTERS 0 MATRICES 0 TOTAL 0

2) AMPHIBOLE STRUCTURES
   FIBERS 0 BUNDLES 0 CLUSTERS 0 MATRICES 0 TOTAL 0

3) NON-ASBESTOS STRUCTURES
   FIBERS 9 BUNDLES 0 CLUSTERS 5 MATRICES 1 TOTAL 15

	.5< STRUCTURES <5um	>5um	TOTAL
ASBESTOS CONC. ON FILTER (STRUCTURES/mm^2)	--	--	<11.90
ASBESTOS CONC. IN AIR (STRUCTURES/cm^3)	--	--	<0.0049

100711

(A4)

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Laboratory Testing Services

RESULT SHEET FOR TEM ASBESTOS AIR SAMPLE

CLIENT: Fred C. Hart Associates

DATE: July 7, 1989

SAMPLE NO.: 05

LTS NO.: T-00308

NO. OF GRID OPENINGS ANALYZED: 12

LAB. NO.: 89-02534

AVG. GRID OPENING AREA: 0.0070 mm^2

VOLUME: 904 liters

TOTAL AREA ANALYZED: 0.084 mm^2

SENSITIVITY: 0.0051 Structure/cm^3

MANUFACTURER: Nucleopore

FILTER SIZE: 385 mm^2

LOT NO.: 81C3A/710/A8

COMPOSITION: Polycarbonate (.4um)

TOTAL NUMBER OF STRUCTURES: 6

TOTAL NUMBER OF ASBESTOS STRUCTURES: 1

MICROGRAPH #'S 1111-1112

STRUCTURE CLASSIFICATION

1) CHRYSOTILE STRUCTURES
   FIBERS 1 BUNDLES 0 CLUSTERS 0 MATRICES 0 TOTAL 1

2) AMPHIBOLE STRUCTURES
   FIBERS 0 BUNDLES 0 CLUSTERS 0 MATRICES 0 TOTAL 0

3) NON-ASBESTOS STRUCTURES
   FIBERS 5 BUNDLES 0 CLUSTERS 0 MATRICES 0 TOTAL 5

	.5< STRUCTURES <5um	>5um	TOTAL
ASBESTOS CONC. ON FILTER (STRUCTURES/mm^2)	11.90	--	11.90
ASBESTOS CONC. IN AIR (STRUCTURES/cm^3)	0.0051	--	0.0051

100712

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LAB. NO.: 89-02534

APPENDIX B

CHAIN of CUSTODY RECORDS

100713

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D51-24

Laboratory Testing Services

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CLIENT: F.C. Hart Assoc.

CHAIN OF CUSTODY RECORD

Lab No.: 89-0[illegible]

Sample Location (Address): Li Tungsten Glencove, NY

Outside Services Project Name: 00266-02-00035-01

Sample I.D. No.	Date Collected	Time	No Of Containers	Sample Identification	Volume Of Air Collected	ASBESTOS-PCM	ASBESTOS-PLM	ASBESTOS-TEM	WETCHEM (specify)	G.C. (specify)	G.C./M.S. (specify)	A.A. (specify)	B.O. (specify)	I.P. (specify)	OPSAT (specify)	OTHER (specify)	REMARKS
01	6/26		1	TEM 1	1170			✓									
02	↓		↓	TEM 2	936			✓									
03	↓		↓	TEM 3	1058			✓									
04	6/27		↓	TEM 4	933			✓									
05	6/27		↓	TEM 5	904			✓									

ADDITIONAL REQUIREMENTS

Shipped Via: Federal Express # 9643704081

Relinquished by (Signature):
Printed Name:
Date/Time:
Agent of:

Relinquished by (Signature): Claire Steppan
Printed Name: Claire Steppan
Date/Time: 6/29 | am
Agent of: LTS

Relinquished by (Signature):
Printed Name:
Date/Time:
Received for Laboratory by (Signature):
Printed Name:

Rec'd by (Signature): Claire Steppan
Printed Name: Claire Steppan
Date/Time: 6/29 | am
Agent of: LTS

Rec'd by (Signature):
Printed Name:
Date/Time:
Agent of:

Date/Time: 6/29/89 | 11:50 am

Remarks:

Sampler (Signature):

Samplers Name (Print): Em. Dimitrakas

100714

Laboratory Testing Services

LAB.NO.: 89-02534

APPENDIX C

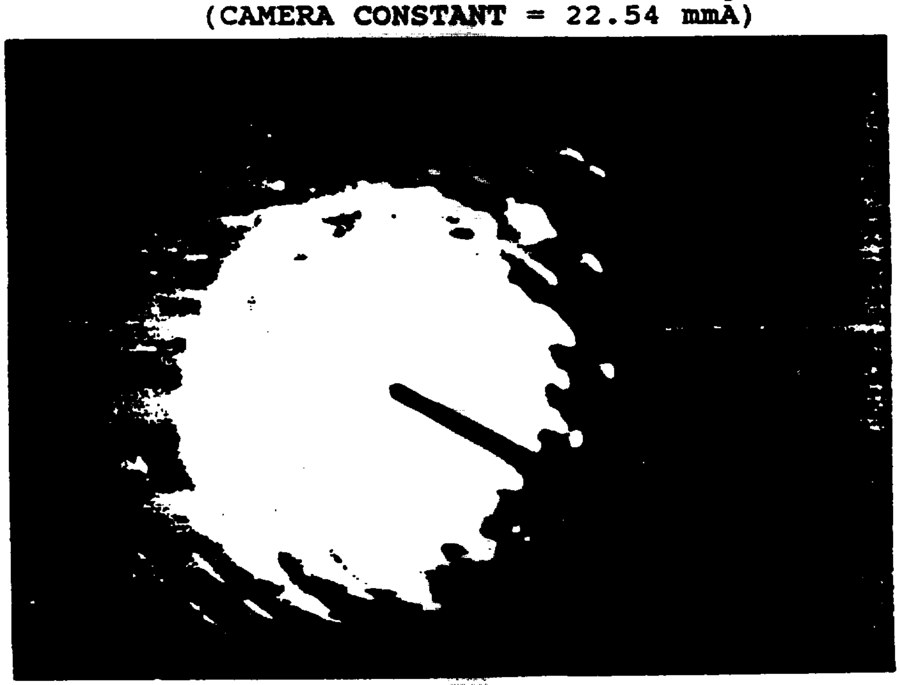
PRINTS OF ELECTRON PHOTOMICROGRAPHS

75 URBAN AVENUE, WESTBURY, NEW YORK 11590 • (516) 334-77?0 • (800) 433-0008 • FAX NO. 516-334-7720

Laboratory Testing Services

MICROGRAPH #1106
ELECTRON MICROGRAPH OF A REPRESENTATIVE
NON-ASBESTOS STRUCTURE
(ORIGINAL MAGNIFICATION = 19,000X)

MICROGRAPH #1105
SELECTED AREA ELECTRON DIFFRACTION (SAED) PATTERN OF A
NON-ASBESTOS STRUCTURE
(CAMERA CONSTANT = 22.54 mmÅ)



100716

75 URBAN AVENUE, WESTBURY, NEW YORK 11590 • (516) 334-7770 • (800) 433-0008 • FAX NO. 516-334-7720

TOTAL ANALYTICAL SERVICES FOR A SAFE ENVIRONMENT

nytest environmental inc.

box 1518 ▫ 60 seaview blvd., port washington, ny 11050 ▫ (516) 625-5500 ▫ fax (516) 625-1274

TOTAL ANALYTIC ERVICES FOR A SAFE ENVIRONMENT

nytest environmental inc.

Project No.: 89-15969

Log In No.: 1874

P.O. No.: 00265-02-00003-01

Date: July 21, 1989

ANALYTICAL DATA REPORT PACKAGE
FOR

Fred C. Hart Assoc.

530 5th Avenue

New York, N.Y. 10036

Attn: Karl Boldt
Ref: L1 Tungsten

SAMPLE IDENTIFICATION	LABORATORY NUMBER	TYPE OF SAMPLE	DATE AND TIME OF SAMPLE COLLECTION

SEE FOLLOWING PAGES FOR RESULTS

REPORT PREPARED BY:
PARAG K. SHAH, Ph. D.
ORGANIC LAB. MANAGER

WE CERTIFY THAT THIS REPORT IS A TRUE REPORT OF RESULTS OBTAINED FROM OUR TESTS OF THIS MATERIAL.

RESPECTFULLY SUBMITTED,
NYTEST ENVIRONMENTAL INC.

DOUGLAS SHEELEY
LABORATORY DIRECTOR

REMO GIGANTE
EXECUTIVE V.P.

bf

100718

J.C. No.: E 0221

HART

Name: KARL BOLDT

Affiliation: ~~HART~~ ~~ENV~~ FRED C. HART ASSOC., INC.

Phone: 530 FIFTH AVE. (212) 840-3990

Address: NEW YORK NY 10036

Client/Job No: 00265-02-00003-01

Job Name: Li TUNGSTEN Location: GLEN COVE, NY

CHAIN OF CUSTODY RECORD

Sample No.	Lab I.D. No.	Date	Time	Matrix	No. of Containers	Analysis Requested/Remarks
IOA-2		7/7/89	4 PM	SORBENT TUBE	1	INORGANIC ACIDS NIOSH METHOD 7300
IOA-3						
IOA-4						
VOC-2						VOCs NEI METHOD
VOC-3						
VOC-4						

Comments: ______

Relinquished by: Karl Boldt Date: 7/7/89 Shipment Method: By Hand
Time: 5 PM Airbill No.: ______

Received by: [signature] Date: 7/7/89 Relinquished by: ______ Date: ______
Time: 5 PM Time: ______

Received by: ______ Date: ______ Relinquished by: ______ Date: ______
Time: ______ Time: ______

Final Disposition of Samples: ______

Received by: ______ Date: ______ Time: ______

HART Form 400 Pink/Field Copy - Yellow/Lab Copy - White/Original - To be returned with results.

100719

Contractor: NYTEST ENVIRONMENTAL INC.
Lab Sample ID No: N9-9558
Sample Matrix: TUBE
Data Release Authorized By:

Project No: 89-15969
Date Sample Received: 07/7/89

VOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: NA
Date Analyzed: 07/14/89
Conc/Dil Factor: 0.1 pH:
Percent Moisture (Not Decanted): NA

CAS Number		Total ug
74-87-3	Chloromethane	1.0 U
74-83-9	Bromomethane	1.0 U
75-01-4	Vinyl Chloride	1.0 U
75-00-3	Chloroethane	1.0 U
75-09-2	Methylene Chloride	0.6 B
67-64-1	Acetone	1.0 U
75-15-0	Carbon Disulfide	0.5 U
75-35-4	1,1-Dichloroethene	0.5 U
75-34-3	1,1-Dichloroethane	0.5 U
540-59-0	Total-1,2-Dichloroethene	0.5 U
67-66-3	Chloroform	0.5 U
107-06-2	1,2-Dichloroethane	0.5 U
78-93-3	2-Butanone	1.0 U
71-55-6	1,1,1-Trichloroethane	0.5 U
56-23-5	Carbon Tetrachloride	0.5 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	0.5 U

CAS Number		Total ug
79-34-5	1,1,2,2-Tetrachloroethane	0.5 U
78-87-5	1,2-Dichloropropane	0.5 U
10061-02-6	Trans-1,3-Dichloropropene	0.5 U
79-01-6	Trichloroethene	0.5 U
124-48-1	Dibromochloromethane	0.5 U
79-00-5	1,1,2-Trichloroethane	0.5 U
71-43-2	Benzene	0.5 U
10061-01-5	cis-1,3-Dichloropropene	0.5 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	0.5 U
591-78-6	2-Hexanone	1.0 U
108-10-1	4-Methyl-2-Pentanone	1.0 U
127-18-4	Tetrachloroethene	0.5 U
108-88-3	Toluene	0.5 U
108-90-7	Chlorobenzene	0.5 U
100-41-4	Ethylbenzene	0.5 U
100-42-5	Styrene	0.5 U
	Total Xylenes	0.5 U
	Total Dichlorobenzene	3.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U), based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

nytest environmental inc

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER: VOC-2
LAB SAMPLE ID NO: N9-3556

Contractor: NYTEST ENVIRONMENTAL INC.
Project No: 89-15969

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	RT	Total ug
1	UNKNOWN	VOA	2:46	6.2 J
2	UNKNOWN	VOA	3:18	12.5 J
3	UNKNOWN	VOA	3:44	14 J
4	UNKNOWN	VOA	4:16	8 J
5	UNKNOWN	VOA	4:24	4 J
6	UNKNOWN	VOA	4:42	8 J
7	UNKNOWN	VOA	4:54	7 J
8	UNKNOWN ACID	VOA	5:10	6 J
9	UNKNOWN	VOA	8:02	0.7 J
10	UNKNOWN	VOA	8:16	1.7 J
11	UNKNOWN	VOA	10:24	1 J
12	UNKNOWN	VOA	13:16	1.3 J
13	FREON	VOA	14:54	1.4 J
14	UNKNOWN	VOA	16:46	0.7 J
15	1,3-DIMETHYL 2,2-DIOLOXANE	VOA	19:22	1 J
16				
17				
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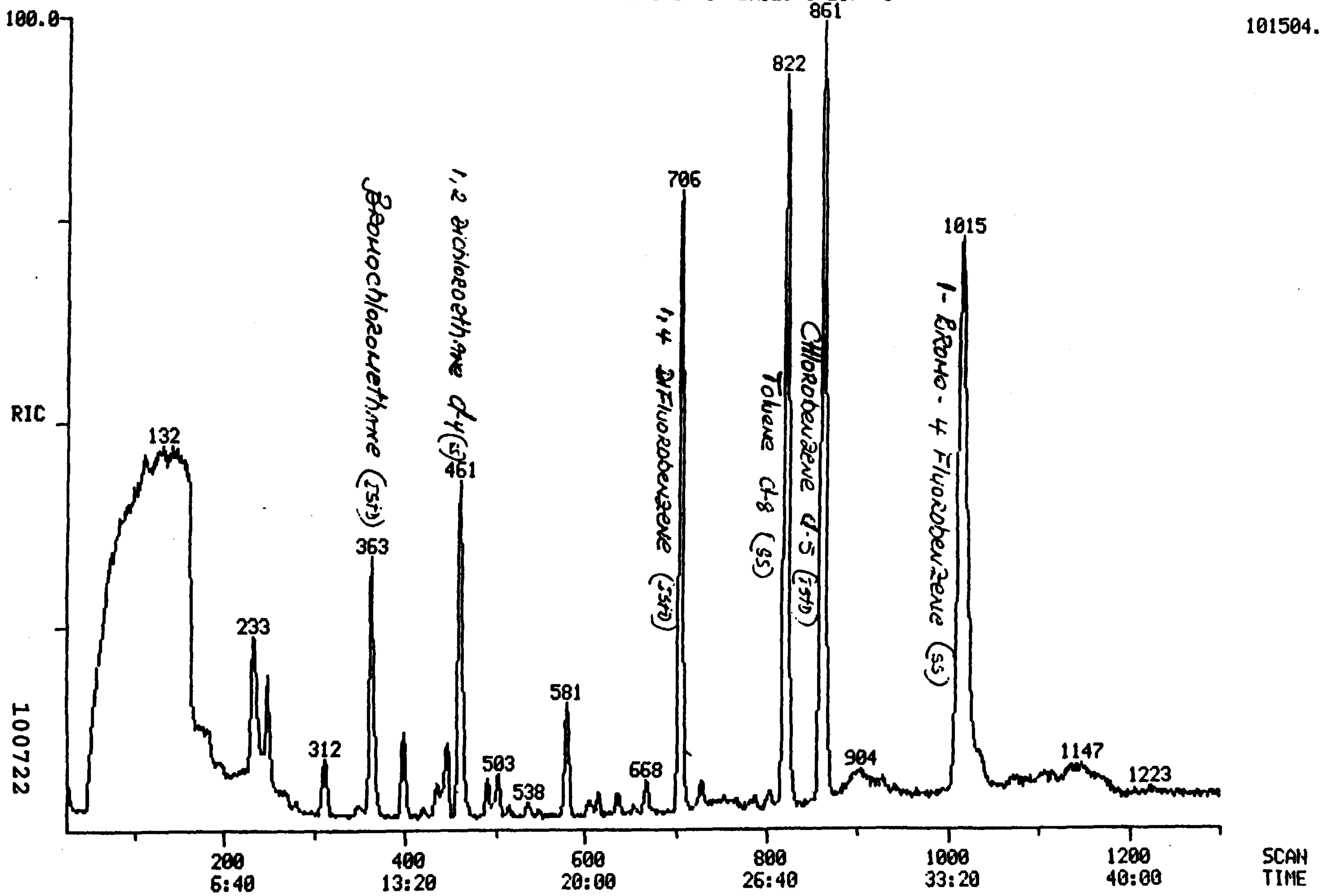
30				

RIC
07/14/89 10:48:00

DATA: D8945 #1070
CALI: D8945 #2

SCANS 25 TO 1300

SAMPLE: F.C.HART,VOC-2/N9-9558,REC'D 7/7/89
CONDS.: TUBE/2MLS,100UL/5ML INSTD
RANGE: G 1,1300 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3



Contractor: NYTEST ENVIR... ...TAL INC.
Lab Sample ID No: N9-9559
Sample Matrix: TUBE
Data Release Authorized By.

Project No: 89-15989
Date Sample Received: 07/7/89

VOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: NA
Date Analyzed: 07/14/89
Conc/Dil Factor: 0.1 pH:
Percent Moisture (Not Decanted): NA

CAS Number		Total ug
74-87-3	Chloromethane	1.0 U
74-83-9	Bromomethane	1.0 U
75-01-4	Vinyl Chloride	1.0 U
75-00-3	Chloroethane	1.0 U
75-09-2	Methylene Chloride	0.6
67-64-1	Acetone	1.0 U
75-15-0	Carbon Disulfide	0.5 U
75-35-4	1,1-Dichloroethene	0.5 U
75-34-3	1,1-Dichloroethane	0.5 U
540-59-0	Total-1,2-Dichloroethene	0.5 U
67-66-3	Chloroform	0.2 J
107-06-2	1,2-Dichloroethane	0.5 U
78-93-3	2-Butanone	1.0 U
71-55-6	1,1,1-Trichloroethane	0.3 J
56-23-5	Carbon Tetrachloride	0.1 J
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	0.5 U

CAS Number		Total ug
79-34-5	1,1,2,2-Tetrachloroethane	0.5 U
78-87-5	1,2-Dichloropropane	0.5 U
10061-02-6	Trans-1,3-Dichloropropene	0.5 U
79-01-6	Trichloroethene	0.5 U
124-48-1	Dibromochloromethane	0.5 U
79-00-5	1,1,2-Trichloroethane	0.5 U
71-43-2	Benzene	0.5 U
10061-01-5	cis-1,3-Dichloropropene	0.5 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	0.5 U
591-78-6	2-Hexanone	1.0 U
108-10-1	4-Methyl-2-Pentanone	1.0 U
127-18-4	Tetrachloroethene	0.5 U
108-88-3	Toluene	0.5 U
108-90-7	Chlorobenzene	0.5 U
100-41-4	Ethylbenzene	0.5 U
100-42-5	Styrene	0.5 U
	Total Xylenes	0.5 U
	Total Dichlorobenzene	3.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U), based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

nytest environmental inc

ORGANICS ANALYSIS DATA SHEET

Contractor: NYTEST ENVIRONMENTAL INC.
Project No: 89-15969

SAMPLE NUMBER: VOC-3
LAB SAMPLE ID NO: N9-9559

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	RT	Total ug
1	UNKNOWN	VOA	2:54	3.7 J
2	UNKNOWN	VOA	3:34	2.3 J
3	UNKNOWN	VOA	6:04	4.6 J
4	TRICHLOROFLUOROMETHANE	VOA	10:20	1.9 J
5	2-METHYLBUTANE	VOA	14:28	0.8 J
6	FREON	VOA	14:50	1 J
7	UNKNOWN ALKANE	VOA	16:20	0.8 J
8	2,2-DIMETHYL 1,3-DIOLOXANE	VOA	19:20	1.6 J
9				
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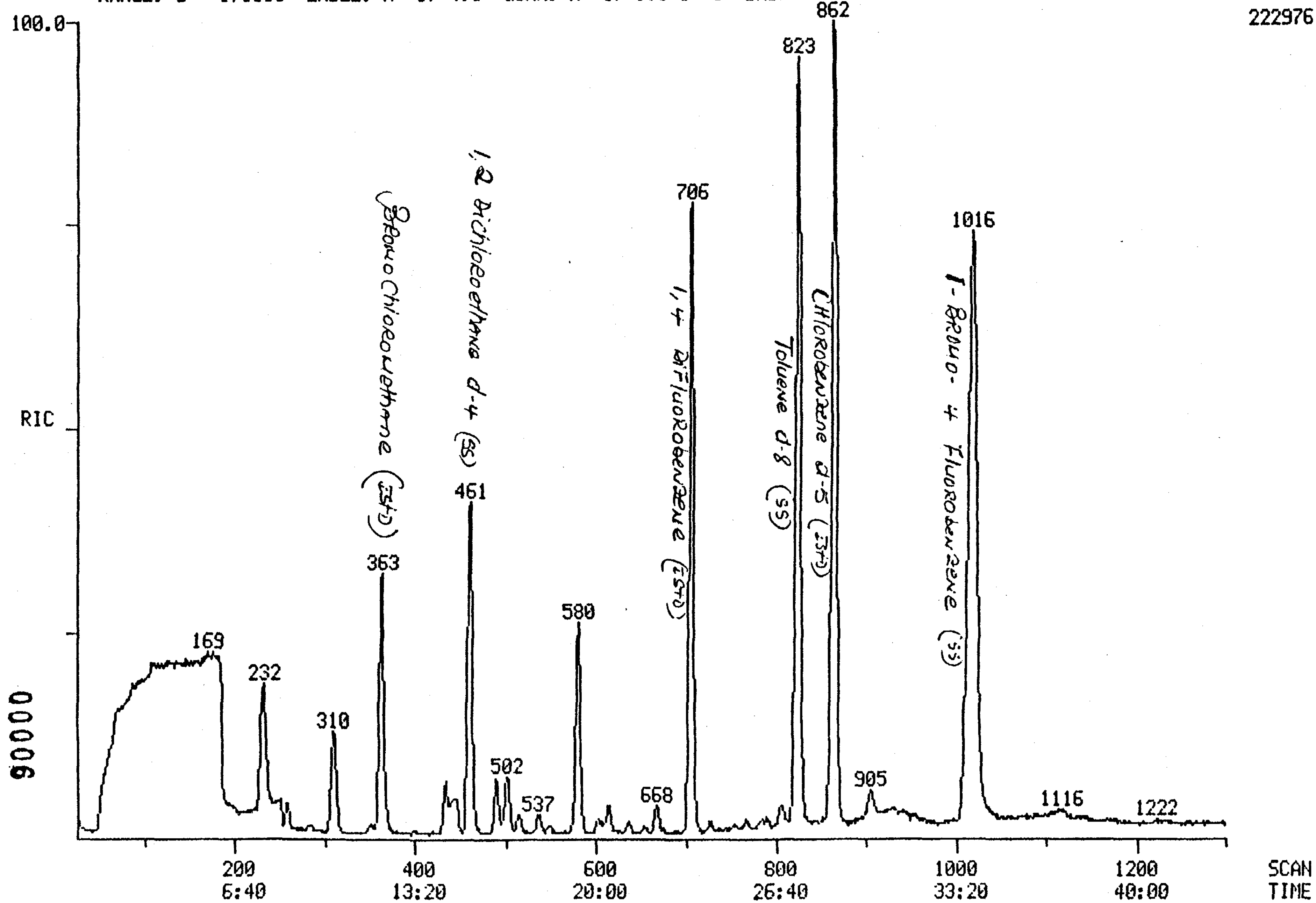
RIC
07/14/89 11:47:00
SAMPLE: F.C.HART,VOC-3/N9-9559,REC'D 7/7/89
CONDS.: TUBE/2MLS,100UL/5ML INSTD
RANGE: G 1,1300 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3

DATA: D8946 #1016 SCANS 25 TO 1300
CALI: D8946 #2

100725



Contractor: NYTEST ENVIRONMENTAL INC.
Lab Sample ID No: N9-9560
Sample Matrix: TUBE
Data Release Authorized By:

Project No: 89-15969
Date Sample Received: 07/7/89

VOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: NA
Date Analyzed: 07/14/89
Conc/Dil Factor: 0.1 pH:
Percent Moisture (Not Decanted): NA

CAS Number		Total ug
74-87-3	Chloromethane	1.0 U
74-83-9	Bromomethane	1.0 U
75-01-4	Vinyl Chloride	1.0 U
75-00-3	Chloroethane	1.0 U
75-09-2	Methylene Chloride	2.6
67-64-1	Acetone	1.0 U
75-15-0	Carbon Disulfide	0.5 U
75-35-4	1,1-Dichloroethene	0.5 U
75-34-3	1,1-Dichloroethane	0.5 U
540-59-0	Total-1,2-Dichloroethene	0.5 U
67-66-3	Chloroform	0.3 J
107-06-2	1,2-Dichloroethane	0.5 U
78-93-3	2-Butanone	1.0 U
71-55-6	1,1,1-Trichloroethane	0.3 J
56-23-5	Carbon Tetrachloride	0.2 J
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	0.5 U

CAS Number		Total ug
79-34-5	1,1,2,2-Tetrachloroethane	0.5 U
78-87-5	1,2-Dichloropropane	0.5 U
10061-02-6	Trans-1,3-Dichloropropene	0.5 U
79-01-6	Trichloroethene	0.5 U
124-48-1	Dibromochloromethane	0.5 U
79-00-5	1,1,2-Trichloroethane	0.5 U
71-43-2	Benzene	0.5 U
10061-01-5	cis-1,3-Dichloropropene	0.5 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	0.5 U
591-78-6	2-Hexanone	1.0 U
108-10-1	4-Methyl-2-Pentanone	1.0 U
127-18-4	Tetrachloroethene	0.5 U
108-88-3	Toluene	0.5 U
108-90-7	Chlorobenzene	0.5 U
100-41-4	Ethylbenzene	0.5 U
100-42-5	Styrene	0.5 U
	Total Xylenes	0.5 U
	Total Dichlorobenzene	3.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U), based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

nytest environmental inc

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER: VOC-4
LAB SAMPLE ID NO: N9-9560

Contractor: NYTEST ENVIRONMENTAL INC.
Project No: 89-15969

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	RT	Total ug
1	UNKNOWN	VOA	3:02	7.1 J
2	UNKNOWN	VOA	3:14	0.7 J
3	UNKNOWN	VOA	3:36	7.1 J
4	UNKNOWN	VOA	4:08	4.4 J
5	UNKNOWN	VOA	4:18	2.0 J
6	UNKNOWN	VOA	4:32	5.5 J
7	TRICHLOROFLUOROMETHANE	VOA	10:18	4.7 J
8	UNKNOWN ALKANE	VOA	16:22	1.4 J
9	2,2-DIMETHYL 1,3-DIOXOLANE	VOA	19:18	1.7 J
10				
11				
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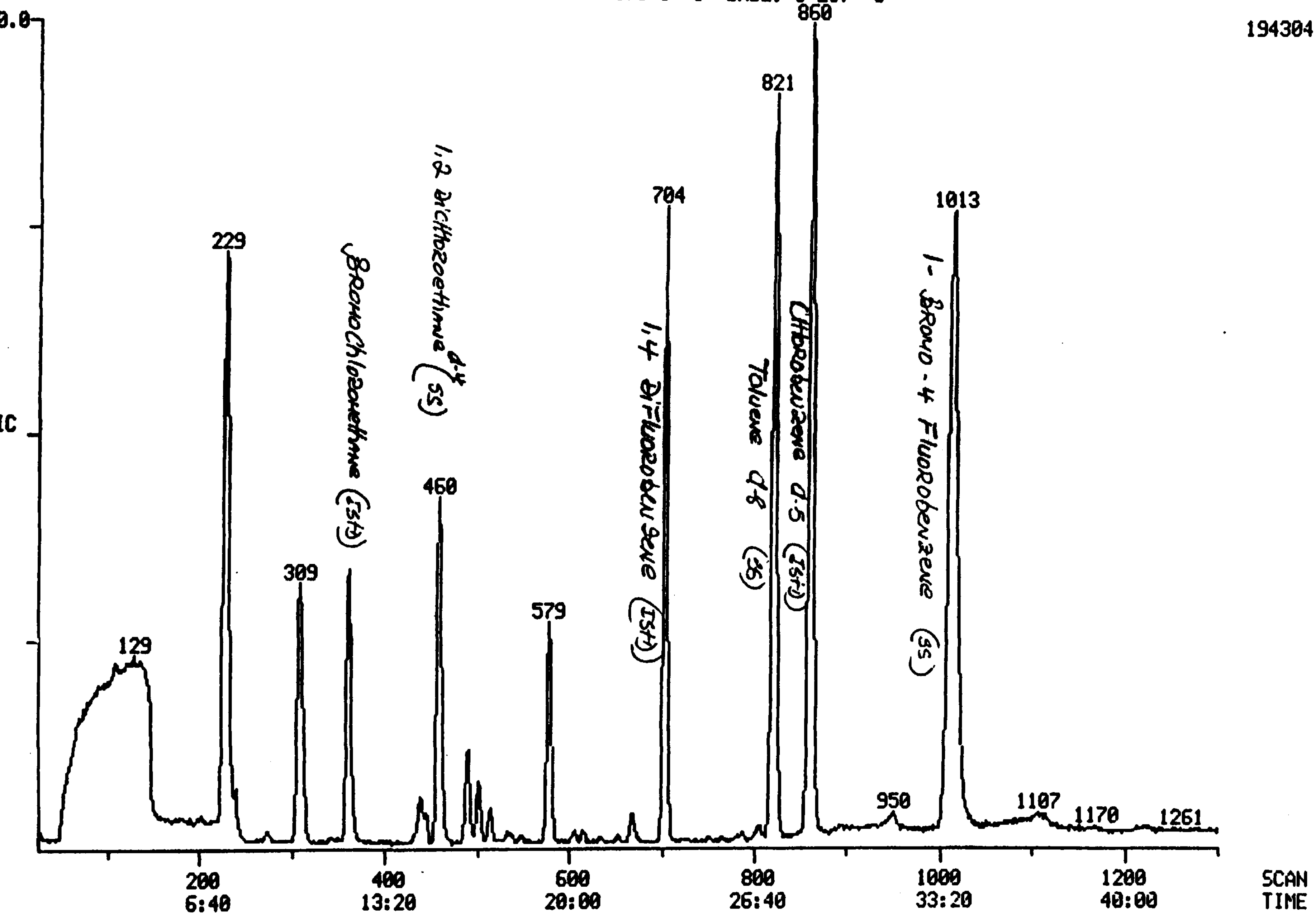
RIC
07/14/89 12:46:00
DATA: D8947 #1012
CALI: D8947 #2
SCANS 25 TO 1300
SAMPLE: FRED C.HART,VOC-4/N9-9560,REC'D 7/7/89,LOGIN 1874
CONDS.: TUBE/2MLS,100UL/5ML INSTD
RANGE: G 1,1300 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3



100728

nytest environmental inc.

ORGANIC DATA REPORTING QUALIFIERS

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detected limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g.: If limit of detection is 10 ug/l and a concentration of 3 ug/l is calculated, report as 3J.)

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

D This flag indentifies all compounds indentified in an analysis at a secondary dilution factor.

Note: Data on soil samples expressed on a dry weight basis.

TOTAL ANALYTICAL SERVICES FOR A SAFE ENVIRONMENT
NEI nytest environmental inc.

SEP 25 1989

September 21, 1989

Fred C. Hart Assoc.
530 5th Avenue
New York, N.Y. 10036

Attention: Karl Boldt

Nytest is pleased to submit our Project No. 89-15969
Log in No. 2224 on your sample (s) received: 8-17-89.

Test sample (s) associated with this project will be retained for a period of thirty (30) days, unless otherwise instructed.

My staff is available to answer any questions concerning our report and we look forward to serving your future analytical needs.

Very truly yours,

Nytest Environmental Inc.

Remo Gigante

Remo Gigante
Exec. VP

RG:gd
Enc.

100730

box 1518 ▫ 60 seaview blvd., port washington, ny 11050 ▫ (516) 625-5500

Z

TOTAL ANALYTICAL SERVICES FOR A SAFE ENVIRONMENT

NEI nytest environmental inc.

REPORT OF ANALYSIS

Date: September 21, 1989

Project No.: 89-15969
Log in No: 2224

Client: Fred C. Hart Associates
Material: (4) Waste Samples
Identification: As below (sample received: 08/17/89)
Client's Order No: 00265-02-00003-01

We find as follows:

Sample Identification		Parameter(s) Anion Concentration, ug			
		Chloride	Fluoride	Nitrate	Sulfate
IOA-11	N901777	1.86	3.28	0.09	1.01
IOA-12	N901778	0.41	2.78	< 0.09	< 0.9
IOA-13	N901779	0.55	1.49	< 0.09	< 0.9
IOA-14	N901780	2.82	1.37	0.10	1.0

Note: The samples were analyzed for inrganic acids according to NIOSH method 7903. Results are given as micrograms of the anion in the sample front and back sorbant sections.

REPORT PREPARED BY:
MARLIN McCRICKARD
INORGANICS LAB MANAGER

DOUGLAS SHEELEY
LABORATORY DIRECTOR

To: Fred C. Hart Associates
530 Fifth Avenue
New York, NY 10036

Att: Karl Boldt
Ref: LI Tungsten

ma

We certify that this report is a true report of results obtained from our tests of this material.

Respectfully submitted,

Nytest Environmental, Inc.

Remo Giganti, Exec. V.P.

100731

TOTAL ANALYTICAL SERVICES FOR A SAFE ENVIRONMENT

NEi nytest environmental inc

CHAIN OF CUSTODY RECORD

Page 1 of 1

SHIP TO: Nytest Environmental Inc.
60 Seaview Blvd.
Port Washington, NY 11050
(516) 625-5500
Attn.

REPORT TO: Client Name NYTEST
Address
Phone
Attn.

Project No.	Project Name	Date Shipped	Carrier
[illegible]	FRED C HART	8/18/89	FED EX
Sampler: (Signature)	Analytical Protocol	Air Bill No.	Cooler No.

Sample I.D.	Date/Time Sampled		Sample Description	No. Of Containers	ANALYSIS REQUESTED
IOA-11	8/17		SORBENT TUBE	1	INORGANIC ACIDS [illegible]
IOA-12	8/17			1	
IOA-13	8/17			1	
IOA-14	8/17			1	

Relinquished by (Signature)	Date / Time	Rec'd By (Signature)	Date / Time
[illegible]	[illegible]		
Print Name: [illegible] FLETCHER		Print Name	
Relinquished by (Signature)	Date / Time	Rec'd by (Signature)	Date / Time
Print Name		Print Name	
Relinquished by (Signature)	Date / Time	Received for Laboratory by (Signature)	Date / Time
Print Name		Print Name	

Special Instructions/Comments

100732

D.C. No.: E 0248

HART

Name: KARL BOLDT
Affiliation: FRED C. HART ASSOCIATES, INC.
Phone: (212) 840-3990
Address: 530 FIFTH AVE. NEW YORK, NY 10036
Client/Job No: 00265-02-00003-01
Job Name: LI TUNGSTEN Location: GLEN COVE, NY

CHAIN OF CUSTODY RECORD

Sample No.	Lab I.D. No.	Date	Time	Matrix	No. of Containers	Analysis Requested/Remarks
IOA 11		8/17/89	5:00PM	SORBENT TUBE	1	INORGANIC ACIDS NIOSH METHOD
IOA 12						
IOA 13						
IOA 14						

Comments:

Relinquished by: Karl Boldt Date: 8/17/89 Shipment Method: Hand
Time: 6:15PM Airbill No.:

Received by: [illegible] Date: 8/17/89 Relinquished by: Date:
Time: 6:15Pm Time:

Received by: Date: Relinquished by: Date:
Time: Time:

Final Disposition of Samples:

Received by: Date: Time:

HART Form 400 Pink/Field Copy - Yellow/Lab Copy - White/Original - To be returned with results.

100733

Re: Inorganic Acids Air Monitoring Results
Li Tungsten

Jim,

Sample IOA-14 was the blank. Only fluoride (presumably HF) showed up higher than the blank. ACGIH TLV is 2.5 mg/m³ (2,500 ug/m³). Concentrations measured were as follows.

Sample No.	Location	(ug F)*	(ug/m³ F)
IOA-11	Lab S	1.91	16.5
IOA-12	Lab NW	1.41	12.0
IOA-13	Lab E	0.12	1.07
IOA-14	Blank	1.37	--

* Blank value subtracted from total analytical result.

100734

nytest environmental inc

Project No.: 89-16154

Log in No: 2455

P.O. No.: Pending

Date: September 29, 1989

ANALYTICAL DATA REPORT PACKAGE
FOR

Direct Environmental Inc.

290 Sanford Street

East Orange, NJ 07018

Attn: Brent Thompson
Ref: LI Tungsten

SAMPLE IDENTIFICATION	LABORATORY NUMBER	TYPE OF SAMPLE	DATE AND TIME OF SAMPLE COLLECTION

SEE NEXT PAGE

REPORT PREPARED BY:
PARAG K. SHAH, Ph. D.
ORGANIC LAB. MANAGER

WE CERTIFY THAT THIS REPORT IS A TRUE REPORT OF RESULTS OBTAINED FROM OUR TESTS OF THIS MATERIAL.

RESPECTFULLY SUBMITTED,
NYTEST ENVIRONMENTAL INC.

Remo Gigante

REMO GIGANTE
EXECUTIVE V.P.

DOUGLAS SHEELEY
LABORATORY DIRECTOR

NJ Cert # 73469
aa

box 1518 □ 60 seaview blvd., port washington, ny 11050 □ (516) 625-5500

nytest environmental inc

Project No.: 89-16154
Log In No: 2455

SAMPLE IDENTIFICATION	LABORATORY NUMBER	TYPE OF SAMPLE	DATE AND TIME OF SAMPLE COLLECTION
1	N2455-001	Waste	09/12/89
2	N2455-002	Waste	09/12/89
3	N2455-003	Waste	09/12/89
4	N2455-004	Waste	09/12/89
5	N2455-005	Waste	09/12/89
6	N2455-006	Waste	09/12/89
7	N2455-007	Waste	09/12/89
8	N2455-008	Waste	09/12/89
9	N2455-009	Waste	09/12/89
10	N2455-010	Waste	09/12/89
11	N2455-011	Waste	09/12/89
12	N2455-012	Waste	09/12/89
13	N2455-013	Waste	09/12/89
14	N2455-014	Waste	09/12/89
15	N2455-015	Waste	09/12/89
16	N2455-016	Waste	09/12/89
17	N2455-017	Waste	09/12/89
18	N2455-018	Waste	09/12/89
19	N2455-019	Waste	09/12/89
20	N2455-020	Waste	09/12/89
21	N2455-021	Waste	09/12/89
22	N2455-022	Waste	09/12/89
23	N2455-023	Waste	09/12/89
24	N2455-024	Waste	09/12/89
25	N2455-025	Waste	09/12/89
26	N2455-026	Waste	09/12/89
27	N2455-027	Waste	09/12/89
S-1	N2455-028	Soil	09/13/89
S-2	N2455-029	Soil	09/13/89
5A	N2455-030	Waste	09/12/89

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Table of Contents

Project No.: 89-16154

Direct Environmental, Inc.
290 Sanford St., East Orange, N.J. 07018
201/677-1800 ■ FAX: 201/675-5919

CHAIN OF CUSTODY / FIELD DATA SHEET

CLIENT: DEI

CLIENT/PROJECT SITE: HART / LI TUNGSTN

PAGE: 1 OF: 1

CLIENT CONTACT: BRENT THOMPSON

PROJECT JOB NO.:

SAMPLE DESCRIPTION/LOCATION	TYPE GRB	TYPE COMP	MATRIX TYPE	DATE SAMPLED	TIME	PRESERVATIVE	NUMBER OF CONTAINERS	COLLECTED BY:	ANALYSIS REQUESTED
1-27 (total 28) (including 5 and 5A)	X		oil	9/12				RBT	PCB
S-1	X		soil	9/13				DK	PCB
S-2	X		soil	9/13				DK	PCB

REMARKS: RESOLUTION @ ~ 1ppm, expect some high concentrations (> 50%). Two week turnaround.

SHIPPED BY:
UPS: ____ CLIENT VEHICLE ____
FEDX: ____ LAB VEHICLE: ____
OTHER: ____ DEI VEHICLE: ____

RELINQUISHED BY:	RECEIVED BY:	DATE:	TIME:	REASON:
B. THOMPSON	Thomas Rymanowski	9/13	1:10	
Thomas Rymanowski		9/13	1:0	

RELINQUISHED TO LABORATORY BY:	ACCEPTED FOR LAB BY:	DATE	TIME
Thomas Rymanowski	[illegible signature]	9/13	1:5

LABORATORY COMMENTS:

100738

00001

Laboratory Deliverable
Check List

		Check if Complete
I.	Cover Page, Format, and Laboratory Certification (Include Cross Reference Table of Field I.D. # and Laboratory I.D. #)	✓
II.	Chain of Custody	✓
III.	Summary Sheets Listing Analytical Results Including QA Data Information	✓
IV.	Laboratory Chronicle and Methodology Summary including Sampling Holding Time Check	✓
V.	Initial Calibration and Continuing Calibration (Time & Date Summary)	X
VI.	Tune Summary (MS)	X
VII.	Blanks (Method, Field, Trip)	✓
VIII.	Surrogate Recovery Summary	✓
IX.	Non-Conformance Summary	✓

[signature]
Laboratory Manager

9/29
Date

nytest environmental inc

Laboratory Chronicle

Project No: 89-16154

Client Name: Direct Environmental

Date Received: 09/13/89
Sample ID: as per Cover Sheet

Organics Extraction:

1. Acids ______
2. Base/Neutrals ______
3. Pesticides/PCBs 09/19/89
4. Dioxin ______

Analysis:

1. Volatiles ______
2. Acids ______
3. Base/Neutrals ______
4. Pesticides/PCBs 09/23/89, 09/25/89, 09/27/89
5. Dioxin ______

Section Supervisor
Review & Approval ______

Inorganics:

1. Metals ______
2. Cyanides ______
3. Phenols ______

Other Analysis:

______

______

______

Section Supervisor
Review & Approval ______

Quality Control Supervisor
Review & Approval ______

100740

If fractions are re-extracted and re-analyzed include dates for both.

nytest environmental inc

Non Conformance Summary

Project No: 89-16154
Log In No: 2455

All samples were analyzed as medium level soils and results are reported on an as received basis.

The chromatograms follow the result sheet in the order as they are listed. Sample 19 was not received. Due to the high concentration of Aroclor 1260 in sample 9 the result is reported in percent by weight. Sample 10 contains two Aroclor 1016 and 1260 and both results are reported separately. All other results are reported as Aroclor 1260.

METHODOLOGY SUMMARY
NYTEST ENVIRONMENTAL INC.

AQUEOUS SAMPLE PREPARATION [See reference 1 and 2]	METHOD
BNA, Pesticides / PCB's Extraction (2)	3510
AA/ICP Sample Preparation (1)	200.7
Furnace Sample Preparation (1)	200.0
Mercury Sample Preparation (1)	245.1
Hexavalent Chromium Sample Preparation (1)	218.5

NON-AQUEOUS EXTRACTIONS [See reference 2]

SOIL AND SEDIMENT SAMPLES:

BNA, Pesticides / PCB's Extraction	3550
AA/ICP Sample Preparation	3050
Furnace Sample Preparation	3050
Mercury Sample Preparation	7471

SLUDGE / PETROLEUM BASED SAMPLES: [See reference 2]

AA/ICP Sample Preparation	3050
Furnace Sample Preparation	3020 / 3030 / 3050
Mercury Sample Preparation	7471

ICP (INDUCTIVELY COUPLED PLASMA):

	REFERENCE 1a/REFERENCE 2a
ALUMINUM	200.7/6010
ANTIMONY	200.7/6010
BARIUM	200.7/6010
BERYLLIUM	200.7/6010
CADMIUM	200.7/6010
CALCIUM	200.7/6010
CHROMIUM	200.7/6010
COBALT	200.7/6010
COPPER	200.7/6010
IRON	200.7/6010
LEAD	200.7/6010
MAGNESIUM	200.7/6010
MANGANESE	200.7/6010
MOLYBDENUM	200.7/6010
NICKEL	200.7/6010
POTASSIUM	200.7/6010
SILVER	200.7/6010
SODIUM	200.7/6010
TIN	200.7/6010
TITANIUM	200.7/6010
VANADIUM	200.7/6010
ZINC	200.7/6010

METHODOLOGY SUMMARY
NYTEST ENVIRONMENTAL INC.

FURNACE AA:	REFERENCE 1 / REFERENCE 2
ANTIMONY	204.1 / 7041
ARSENIC	206.2 / 7060
LEAD	239.2 / 7421
SELENIUM	270.2 / 7740
THALLIUM	279.2 / 7841
TIN	282.2
VANADIUM	286.2 / 7911
MERCURY	245.1 / 7470

AQUEOUS METHODOLOGIES: [See reference 3]

Organochlorine Pesticides and PCB's by Gas Chromatography	608
Herbicides by Gas Chromatography	362
Purgeable Organics by GC/MS	624
Base/Neutral, Acids by GC/MS	625
2,3,7,8 - TCDD by GC/MS	613 / 625

NON - AQUEOUS METHODOLOGIES: [See reference 2]

Gas Chromatography / Mass Spectrometry for:

Purgeable Organics	8240
Base / Neutral and Acid Extractables	8270
Organochlorine Pesticides and PCB's by Gas Chromatography	8080

MISCELLANEOUS ANALYSIS: [See reference 2]

Extraction Procedure Toxicity	1310
Ignitability	1010
Corrosivity	1110
Reactivity	CHAPTER 8.3

Toxicity Characteristic Leaching Procedure (TCLP) [Reference 5]

METHODOLOGY SUMMARY
NYTEST ENVIRONMENTAL INC.

ADDITIONAL INORGANIC PARAMETERS

PARAMETER	REFERENCE 1	REFERENCE 2
BROMIDE	320.1	
COLOR	110.2	
CONDUCTANCE	120.1	
CONDUCTANCE		9050
ODOR	140.1	
pH	150.1	
pH		9040
TDS	160.2	
TSS	160.2	
TS	160.3	
HARDNESS	130.1	
TEMPERATURE	170.1	
TURBIDITY	180.1	
ACIDITY	305.1	
ALKALINITY	310.1	
AMMONIA	350.2,.3	
CHLORIDE	325.3	
CHLORIDE		9252
RESIDUAL CHLORINE	330.2	
COD	410.3,405.1	
CYANIDE	335.3	
OIL AND GREASE	413.1,.2	
OIL AND GREASE		9070
FLUORIDE	340.2	
TKN	351.2	
NO2/NO3	353.2	
D.O.	360.2	
PETROLEUM-HYDROCARBONS (see reference 4)	418.1	
PHENOL	420.2	
PHOSPHORUS	365.1	
SILICA	370.1	
SULFATE	375.4,.2	
SULFIDE	376.1	
SURFACTANTS	425.1	
TOC	415.1	

REFERENCES:

(1) - 600 / 4-79-002 Methods for Chemical Analysis of Water and Waste
(1a) - 600 / 4-79-002 Methods for Chemical Analysis of Water and Waste As modified by the EPA CLP Statement of Work 787
(2) - SW 846 Test Methods for Evaluating Solid Waste
(2a) - SW 846 Test Methods for Evaluating Solid Waste As modified by the EPA CLP Statement of Work 787
(3) - 40 CFR Part 136, VOL. 49, No. 209 Test Parameters for the Analysis of Pollutants
(4) - as modified by NJDEP - BISE (for non aqueous samples)
(5) Federal Register Vol 51 No. 216 Friday 11/7/86 p.40643 - 40652

ORGANIC DATA REPORTING QUALIFIERS

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detected limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g.: If limit of detection is 10 ug/l and a concentration of 3 ug/l is calculated, report as 3J.)

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

D This flag indentifies all compounds indentified in an analysis at a secondary dilution factor.

Note: Data on soil samples expressed on a dry weight basis.

nytest environmental inc

REPORT OF ANALYSIS

Project No.: 89-16154
Log In No: 2455

We find as follows:

Results in ppm, as received:

Sample Identification		Parameter(s) Total PCB's
1	N2455-001	< 1
2	N2455-002	< 1
3	N2455-003	< 1
4	N2455-004	< 1
5	N2455-005	< 1
6	N2455-006	47 (as A1260)
7	N2455-007	89 (as A1260)
8	N2455-008	83 (as A1260)
9	N2455-009	> 60% (as A1260)
10	N2455-010	53 (as A1016) and 35 (as A1260)
11	N2455-011	87 (as A1260)
12	N2455-012	92 (as A1260)
13	N2455-013	< 1
14	N2455-014	< 1
15	N2455-015	< 1
16	N2455-016	< 1
17	N2455-017	9.3 (as A1260)
18	N2455-018	88 (as A1260)
19	N2455-019	< 1
20	N2455-020	< 1
21	N2455-021	< 1
22	N2455-022	< 1
23	N2455-023	< 1
24	N2455-024	< 1
25	N2455-025	< 1
26	N2455-026	< 1
27	N2455-027	< 1
S-1	N2455-028	< 1
S-2	N2455-029	< 1
5A	N2455-030	< 1

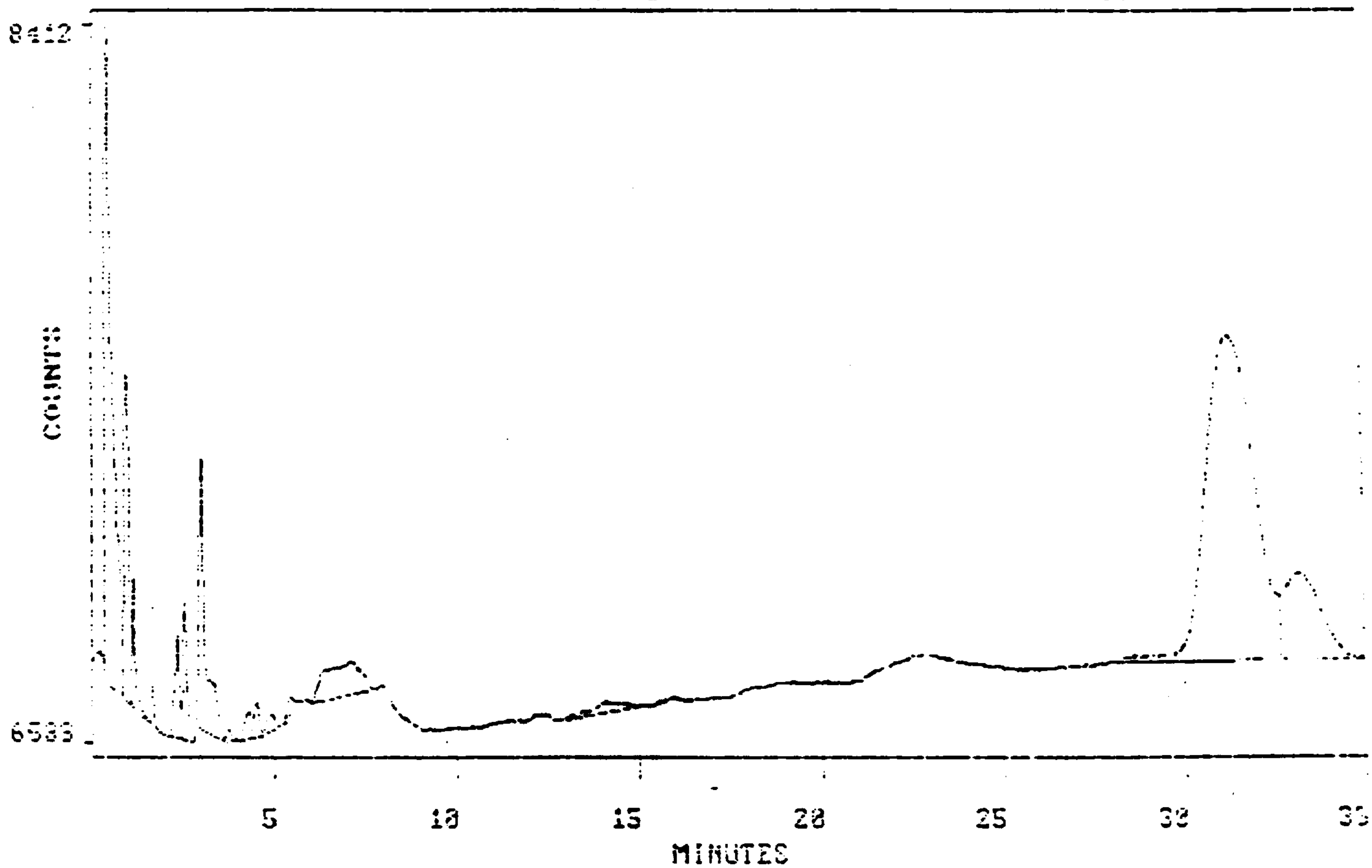
Time:10:55:40 Date.TUE 26 SEP 89

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:16:40:11 Date:MON 25 SEP 89
Method:A4

Direct Env. 1

FILE: N2455001 SCALE: 1 RANGE (MIN.): 0.97 TO 35.0?



100747

Channel #.....4   Time 17.16.12   Date MON 25 SEP 89
Run #1

Sample name.........DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file D1:N2455001
Method name.........A4

Author ....METHOD 608 /// 80803 JCR
Instrument.....TRACOR 550 w. ECD
Column. 1.5%SP2250/1.95%SP2401
Notes..........
SUL

Run time.......35.00 min.   Delay time...0.00 min.
Acq. time......16:40:11   Acq. date....MON 25 SEP 89
Start PW.......10.00 sec.   End PW.......30.00 sec.
Slope sens.....2.00 uv/sec.

Area reject....500
peaks found..17

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.429			14.493	21625	1673	BV
2	0.940			5.464	8153	833	VV
3	1.142			1.397	2084	342	VB
4	1.665			0.386	576	106	BB
5	2.340			1.812	2704	269	BV
6	2.559			1.709	2550	363	VB
7	2.984			5.601	8357	705	BB
8	4.253			0.567	846	71	BV
9	4.512			0.639	953	88	VB
10	4.933			0.497	742	41	BB
11	5.436			0.470	702	49	BB
12	7.147			3.752	5599	78	BB
13	14.164			1.182	1764	28	BB
14	31.350			51.803	77296	823	BV
15	33.239			10.228	15261	221	VB
TOTALS				100.000	149212		

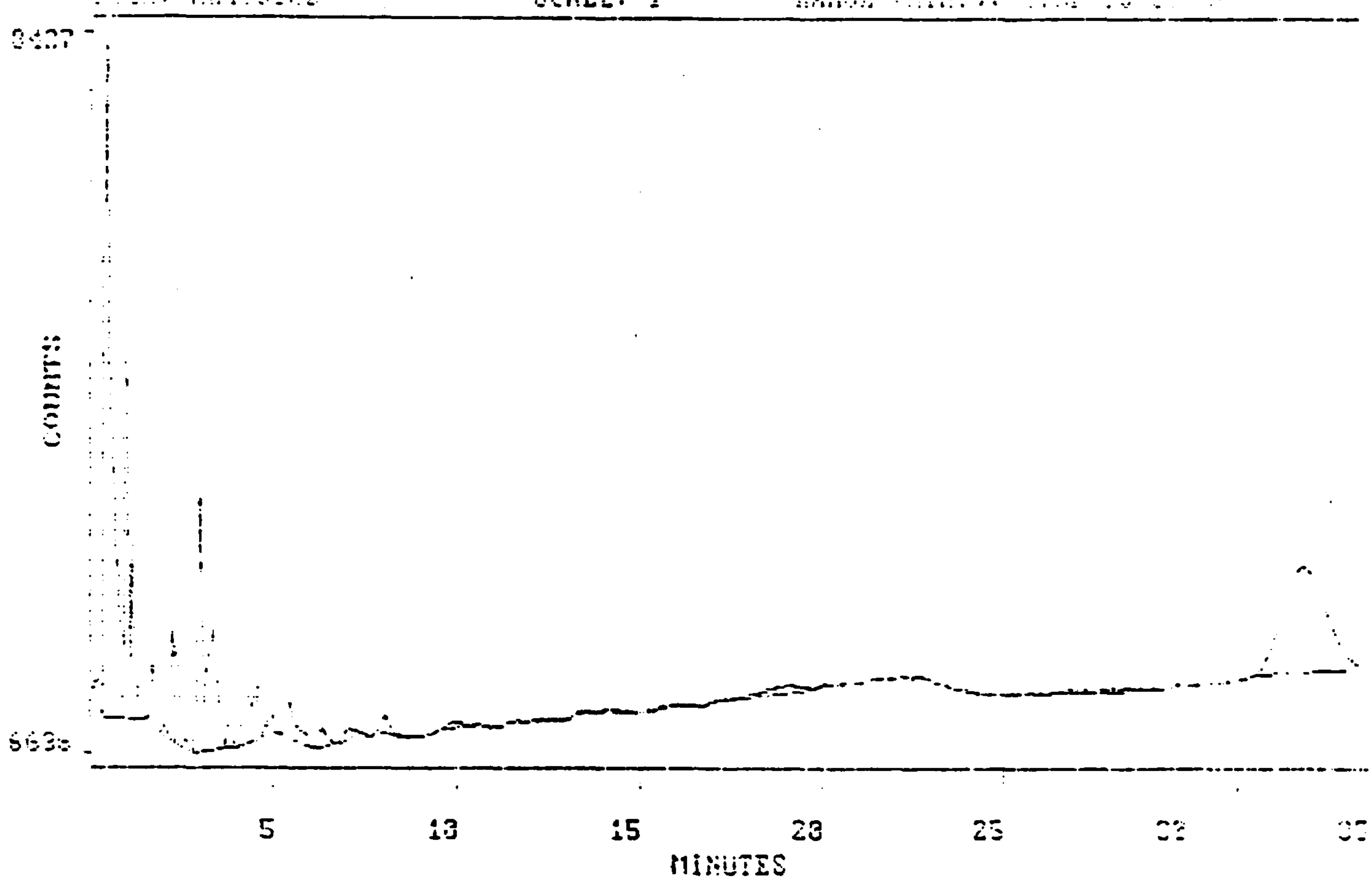
RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:11:06:08 Date:TUE 26 SEP 89

Time:17:19:44 Date:MON 25 SEP 89
Method:A4

Direct ENV. 2

FILE: [illegible] SCALE: 1 RANGE (MIN.): [illegible]



100749

Channel #......4   Time:17:55:31   Date.MON 25 SEP 89
Run #1

Sample name.........DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file...........D1:N2455002
Method name.........A4

Author.........METHOD 608 /// 80803 JCR
Instrument.....TRACOR 550 w. ECD
Column.........1.5%SP2250/1.95%SP2401
Notes..........
2UL 1G/100ML

Run time ....35.00 min.   Delay time...0.00 min.
Acq. time .....17:19:44   Acq. date....MON 25 SEP 89
Start PW. .....10.00 sec.   End PW.......30.00 sec.
Slope sens.....2.00 uv/sec.

Area reject....500
peaks found..22

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.203			0.925	737	49	BB
2	0.434			28.554	22739	1699	BV
3	0.964			8.300	6610	979	VV
4	1.155			3.615	2879	435	VB
5	2.237			2.464	1962	281	VV
6	2.353			2.981	2374	250	VB
7	2.995			7.246	5770	630	BV
8	3.342			7.419	5908	308	VB
9	3.768			0.644	513	58	BB
10	4.265			2.442	1945	136	BV
11	4.527			1.802	1435	141	VB
12	5.425			2.383	1898	88	BB
13	6.346			1.086	865	46	BB
14	7.086			0.672	535	24	BB
15	8.049			0.974	776	47	BB
16	19.106			1.636	1303	19	BB
17	33.333			26.855	21386	262	BB
TOTALS				100.000	79635		

100750

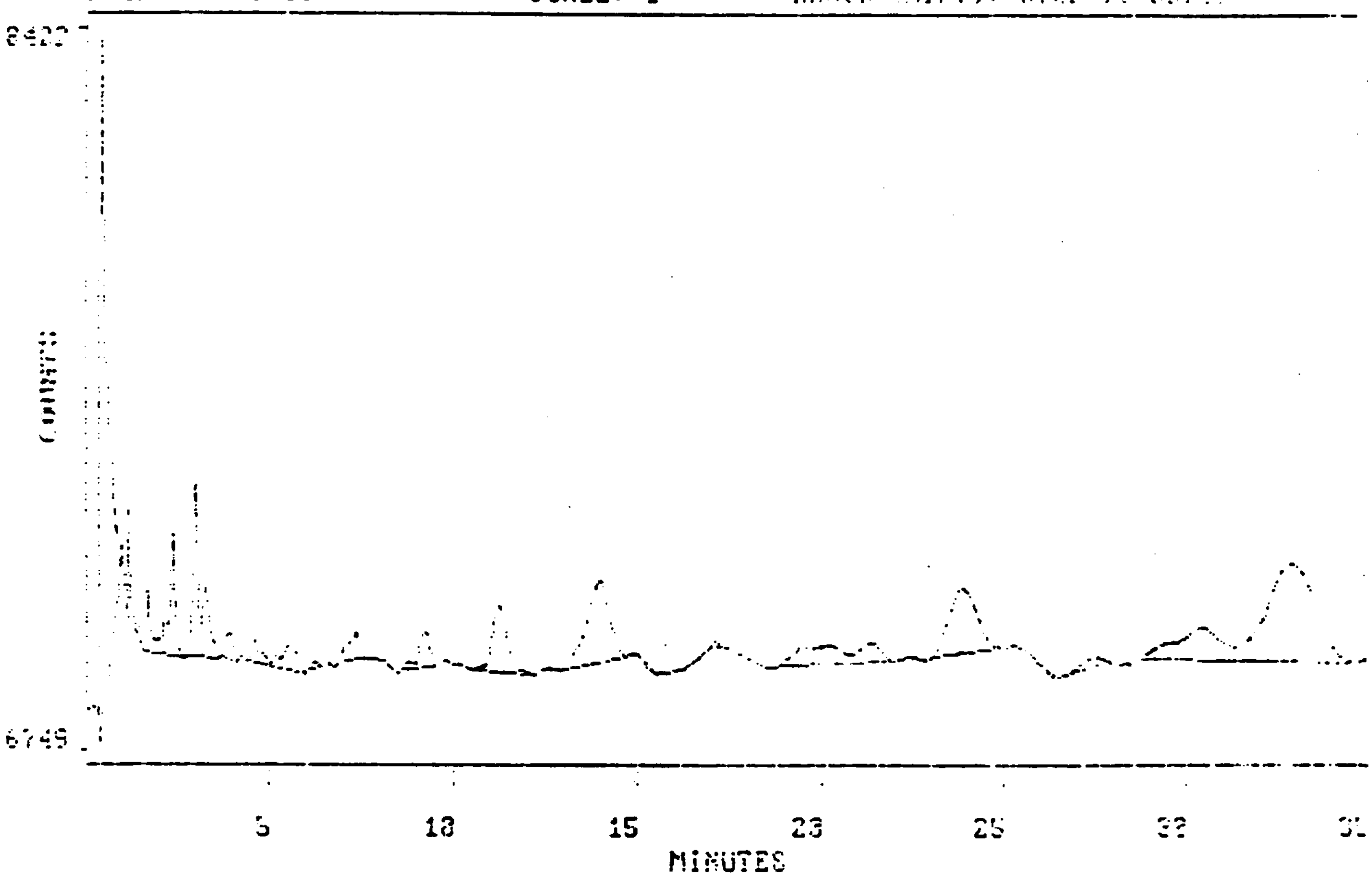
RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:11:08:22 Date TUE 26 SEP 89

Time:17:56:53 Date:MON 25 SEP 89
Method:A4

Direct Env. 3

FILE: M0455003 SCALE: 1 RANGE (MIN.): 0.00 TO 35.00



100751

Channel #......   Time.14.47.01   Date TUE 26 SEP 89

Sample name.........DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file N2455003
Method name.........A4

Author........METHOD 608 /// 80803 JCR
Instrument.....TRACOR 550 w. ECD
Column 1.5%SP2250/1.95%SP2401
Notes...........2UL   1G/100ML

Run time.......35.00 min.   Delay time...0.00 min.
Acq. time......17:56:53   Acq. date....MON 25 SEP 89
Start PW.......15.00 sec.   End PW.......30.00 sec.
Actual PW......10.0   Slope sens.....4.00 uv/sec.

Area reject....300
peaks found..14

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.433			33.267	20700	1623	BB
2	1.151			2.460	1531	247	BB
3	1.690			2.027	1261	141	BV
4	2.093			0.717	446	66	VV
5	2.384			3.716	2312	286	VB
6	2.979			5.636	3507	403	BV
7	3.244			3.409	2121	154	VB
8	3.933			1.168	727	57	BB
9	4.572			0.572	356	39	BB
10	9.225			1.355	843	54	BB
11	11.300			4.680	2912	129	BB
12	13.989			7.512	4674	139	BB
13	23.994			10.928	6800	136	BB
14	33.017			22.554	14034	186	BB
TOTALS				100.000	62224		

100752

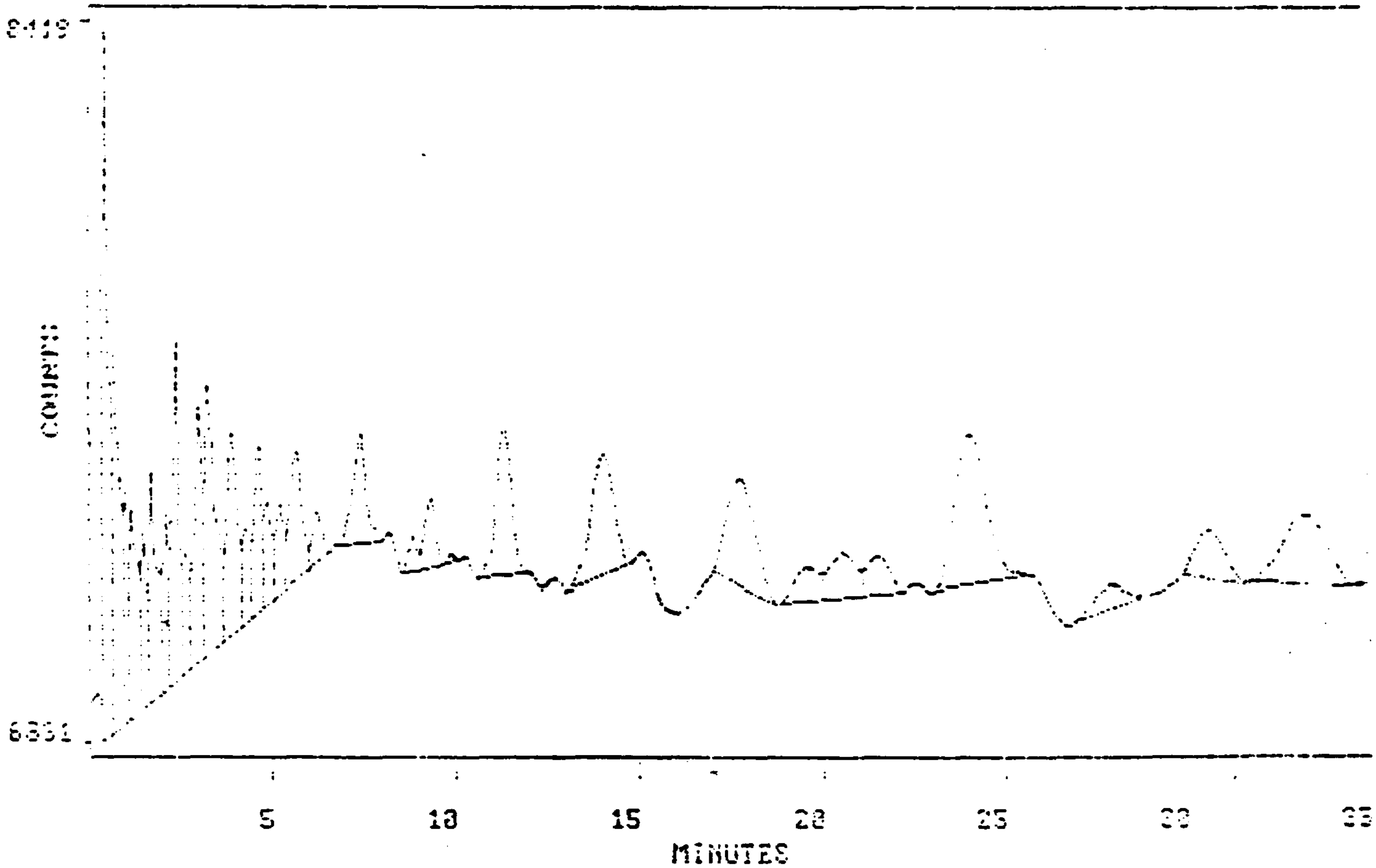
Time.11.10.37 Date:TUE 26 SEP 89

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:18.49.56 Date.MON 23 SEP 89
Method:A4

Direct Env. 4

FILE: N2455804 SCALE: 1 RANGE (MIN.): 0.07 TO 35.00



100753

Channel #......4   Time.19.25:45   Date.MON 25 SEP 89
Run #1 of 17

Sample name.........DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file...........D1:M2455004
Method name.........A4

Author.......METHOD 608 /// 80803 JCR
Instrument......TRACOR 550 w. ECD
Column........1.5%SP2250/1.95%SP2401
Notes..........
2UL 1G/100ML

Run time.......35.00 min.   Delay time...0.00 min.
Acq. time......18:49:56   Acq. date....MON 25 SEP 89
Start PW.......10.00 sec.   End PW.......30.00 sec.
Slope sens.....2.00 uv/sec.

Area reject....500
peaks found..32

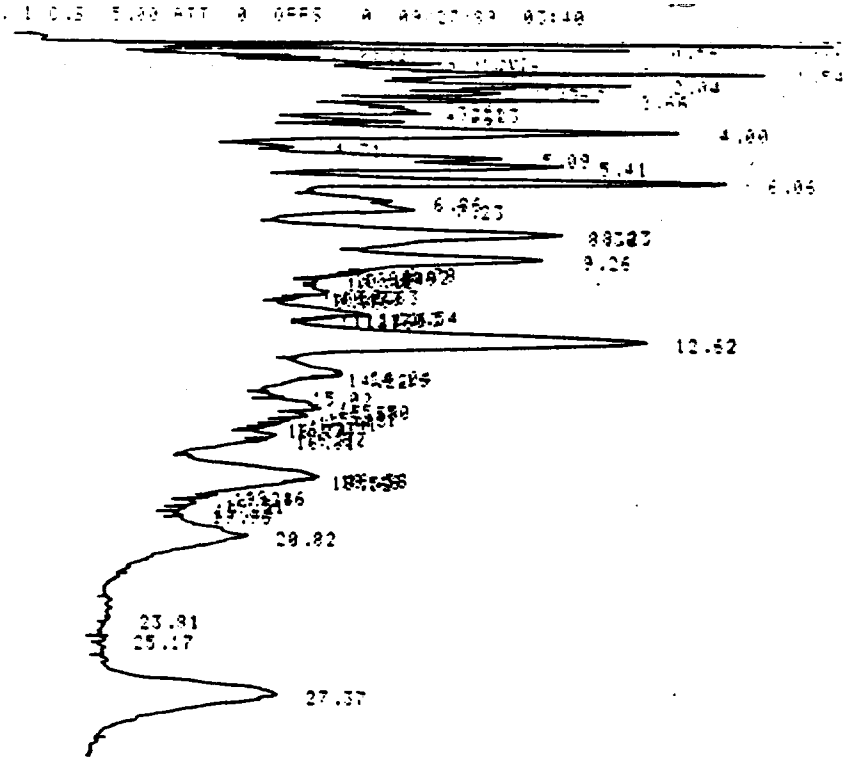
AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.433			7.613	16517	1584	BV
2	0.664			4.843	10506	835	VV
3	0.957			2.218	4813	517	VV
4	1.153			3.256	7063	479	VV
5	1.472			1.680	3645	392	VV
6	1.697			3.179	6896	516	VV
7	2.095			1.954	4240	393	VV
8	2.389			4.617	10016	756	VV
9	2.639			1.605	3482	265	VV
10	2.992			3.746	8126	568	VV
11	3.248			5.775	12528	594	VV
12	3.875			4.012	8703	446	VV
13	4.267			1.489	3231	208	VV
14	4.625			2.534	5497	374	VV
15	4.885			1.573	3412	229	VV
16	5.228			1.463	3173	203	VV
17	5.662			3.061	6640	289	VV
18	6.231			1.030	2234	114	VE
19	7.417			2.742	5948	241	EE
20	8.852			0.625	1357	76	EV
21	9.348			1.479	3208	159	VB
22	11.375			4.349	9436	322	EE
23	14.053			5.345	11595	264	BE
24	17.786			5.739	12451	235	EE
25	19.617			1.521	3300	72	EV

00017

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	24.117	8.975	19471	330	EE
29	27.871	1.345	2917	58	EE
30	30.639	2.706	5871	107	EE
31	33.283	5.816	12617	152	EE
TOTALS		100.000	216951		

CH. 1 C.S 5.00 ATT 0 OFFS 0 09/27/89 03:40



TEMP: ISO 200 C
3% OV-1
6FT:4MM ID ECD
TRACOR 550A -1
METH'S 608 /5098 /8080 /S150

D-2000 09/27/89 03:40

SAMPLE: TAG: 98 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.32	21998	1509	0.32	BU	
2	0.44	1259	266	0.44	TBU	
3	0.56	1968	642	0.56	TUB	
5	0.84	1028	201	0.84	TUU	
6	0.96	1205	235	0.96	TUU	
7	1.12	2175	334	1.12	TUU	
8	1.20	1861	372	1.20	TUU	
9	1.30	1420	286	1.30	TUU	
10	1.43	2727	389	1.43	TUU	
11	1.54	8475	795	1.54	TUU	
12	1.81	2748	353	1.81	TUU	
13	2.04	6961	600	2.04	TUU	
14	2.19	3315	448	2.19	TUU	
15	2.36	3446	423	2.36	TUU	
16	2.43	2659	410	2.43	TUU	
17	2.66	5914	539	2.66	TUU	
18	2.94	2695	281	2.94	TUU	
19	3.11	2983	290	3.11	TUU	
20	3.23	2989	304	3.23	TUU	
21	3.58	3358	259	3.58	TUU	
22	4.00	13696	592	4.00	TUB	
24	5.09	5206	321	5.09	TUU	
25	5.41	7343	379	5.41	TUB	
26	6.06	9506	561	6.06	TBB	
28	7.23	1664	98	7.23	BB	
29	8.23	12672	364	8.23	BU	
31	9.26	9815	324	9.26	UU	
42	11.54	1765	104	11.54	BU	
47	12.62	21584	460	12.62	BU	
48	14.04	2213	95	14.04	TBU	
50	14.22	1173	72	14.22	TUU	
52	15.50	2786	120	15.50	TUU	
54	15.81	1574	115	15.81	TUU	
56	16.01	961	99	16.01	TUU	
60	16.62	1699	104	16.62	TUU	
61	16.81	1963	98	16.81	TUB	
62	18.38	6191	181	18.38	BU	
64	18.52	3754	164	18.52	UU	
70	20.82	6405	120	20.82	BB	
73	27.37	16775	229	27.37	BB	
TOTAL						
---	---	209740	13676			

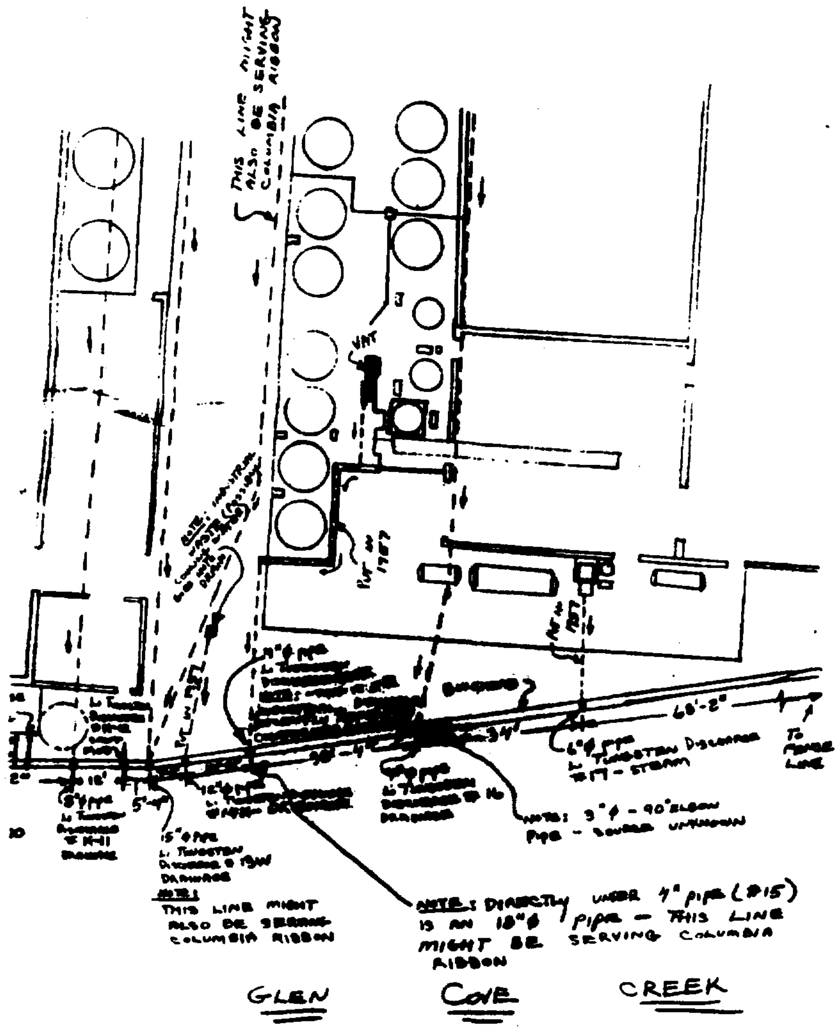
100756

REFERENCE NO. 27

WILLIAM F. COSULICH ASSOCIATES, ENVIRONMENTAL ENGINEERS, N. Y.

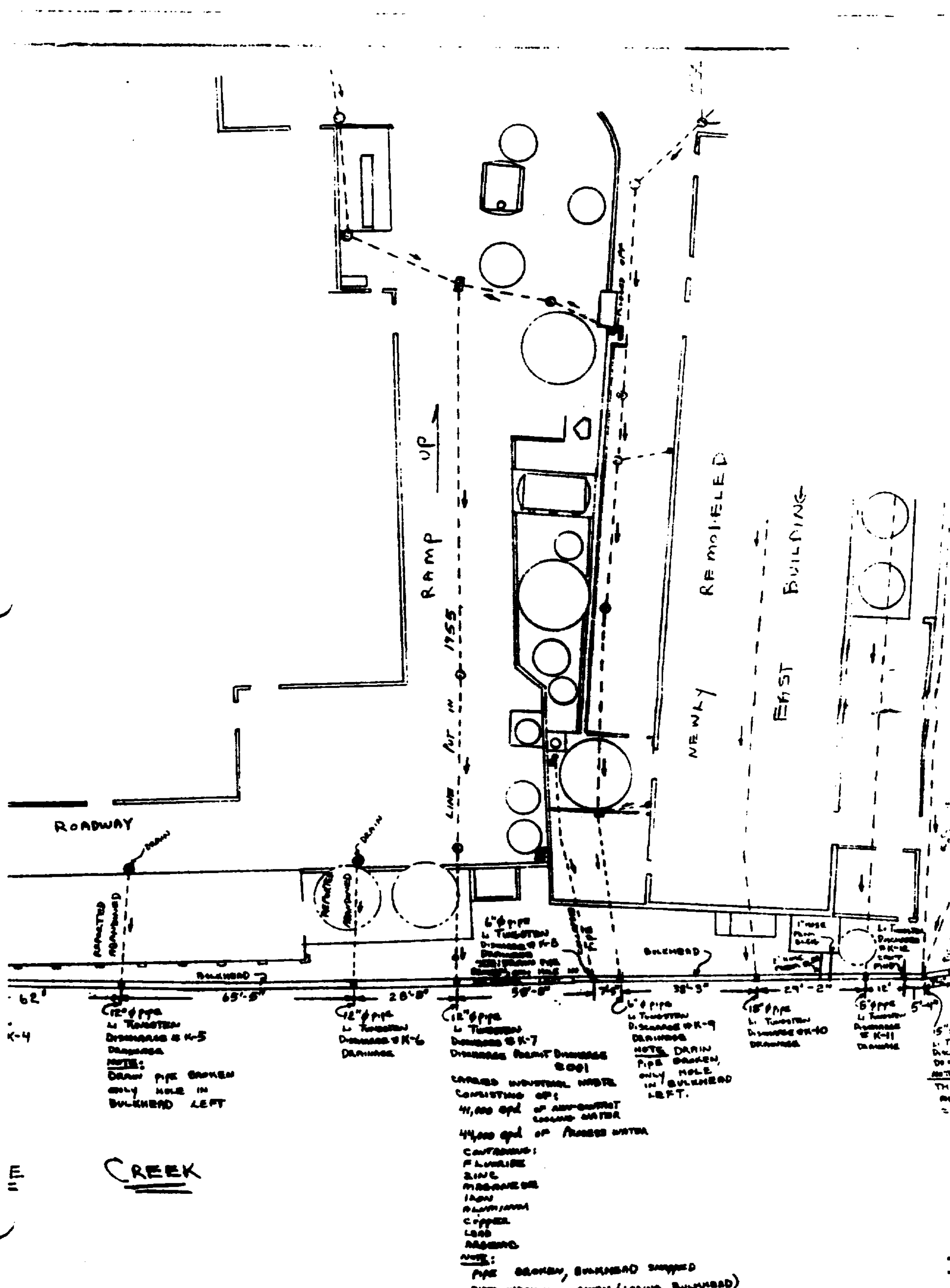
By J *K Date 2/7/75 Subject L. I. TUNGSTEN'S DISCHARGES TO GLEN COVE CREEK Sheet No. 1 of 1 Job No. 283

NOTE: DRAWING FROM L. I. TUNGSTEN ENTITLED "UNDERGROUND DRAINAGE LINES" DATED JANUARY 1959 WAS USED FOR BACKGROUND INFORMATION.



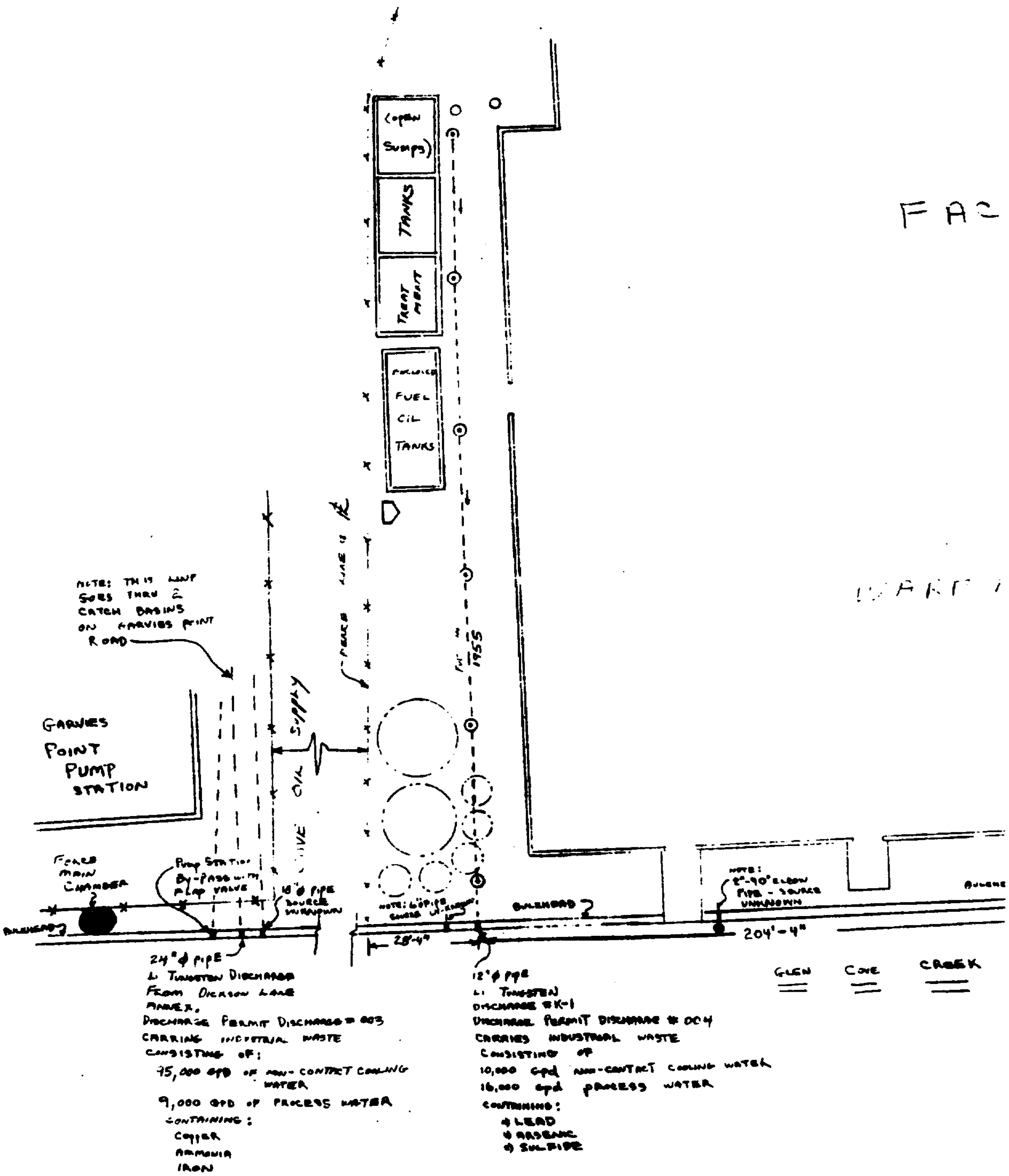
NOTE: NEXT PIPE EAST ON BULKHEAD & UNDER BOARDWALK. ... MIX - THIS IS AN 18"φ PIPE AND IS THE MAIN DISCHARGE PIPE FROM POWERS CHEMCO.

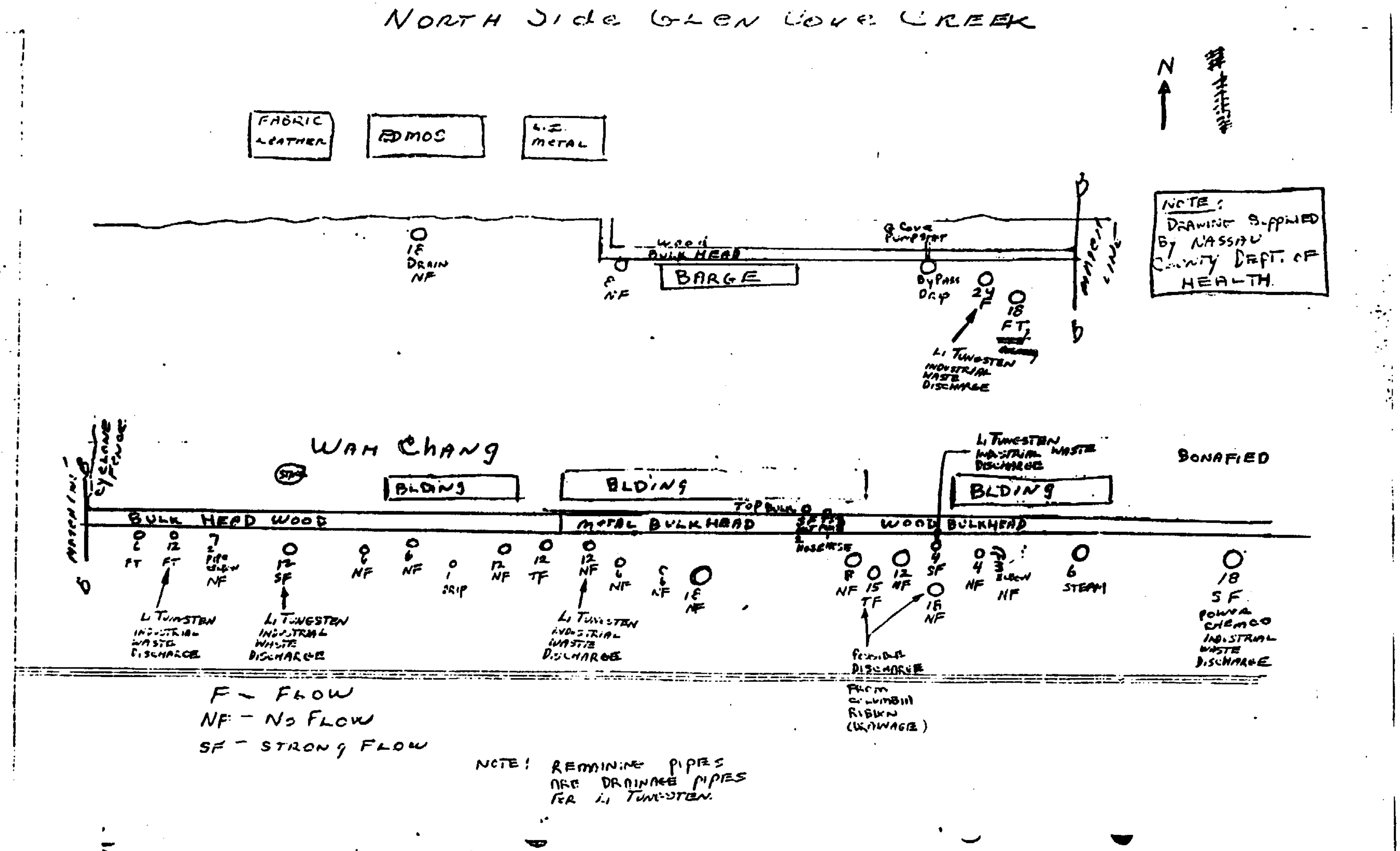
100758



RAMP
UP
LINE PUT IN 1955
NEWLY REMODELED EAST BUILDING
ROADWAY
DRAIN
DRAIN
BULKHEAD
BULKHEAD
62'
65'-5"
28'-8"
38'-3"
29'-2"
12'
5'-4"
K-4
12" ϕ pipe
Discharge # K-5
Drainage
NOTE:
Drain pipe broken
only hole in
Bulkhead left
12" ϕ pipe
Discharge # K-6
Drainage
12" ϕ pipe
Discharge # K-7
6" ϕ pipe
Discharge # K-8
Drainage
6" ϕ pipe
Discharge # K-9
Drainage
NOTE DRAIN
PIPE BROKEN,
ONLY HOLE
IN BULKHEAD
LEFT.
15" ϕ pipe
Discharge # K-10
Drainage
6" ϕ pipe
Discharge
K-11
Drainage
44,000 gpd of
Contains:
Zinc
Iron
Copper
Lead
NOTE:
Pipe broken, Bulkhead
dirt washing away (losing Bulkhead)
CREEK

100759


(open Sumps)
TANKS
TREAT MENT
FUEL OIL TANKS
FAC
WARE
1955
NOTE: THIS LINE GOES THRU 2 CATCH BASINS ON GARVIES POINT ROAD
GARVIES POINT PUMP STATION
SUPPLY
OIL
FORCE MAIN CHAMBER
Pump Station By-Pass with Flap Valve
18"ϕ PIPE SOURCE UNKNOWN
BULKHEAD 2
NOTE: 2"-90° ELBOW PIPE - SOURCE UNKNOWN
28'-4"
204'-4"
GLEN COVE CREEK
24"ϕ PIPE
L.I. TUNGSTEN DISCHARGE FROM DICKSON LANE ANNEX.
DISCHARGE PERMIT DISCHARGE # 003
CARRING INDUSTRIAL WASTE
CONSISTING OF:
75,000 GPD OF NON-CONTACT COOLING WATER
9,000 GPD OF PROCESS WATER
CONTAINING:
COPPER
AMMONIA
IRON
12"ϕ PIPE
L.I. TUNGSTEN
DISCHARGE #K-1
DISCHARGE PERMIT DISCHARGE # 004
CARRIES INDUSTRIAL WASTE
CONSISTING OF
10,000 gpd NON-CONTACT COOLING WATER
16,000 gpd PROCESS WATER
CONTAINING:
LEAD
ARSENIC
SULFIDE



Plat. 2

100761

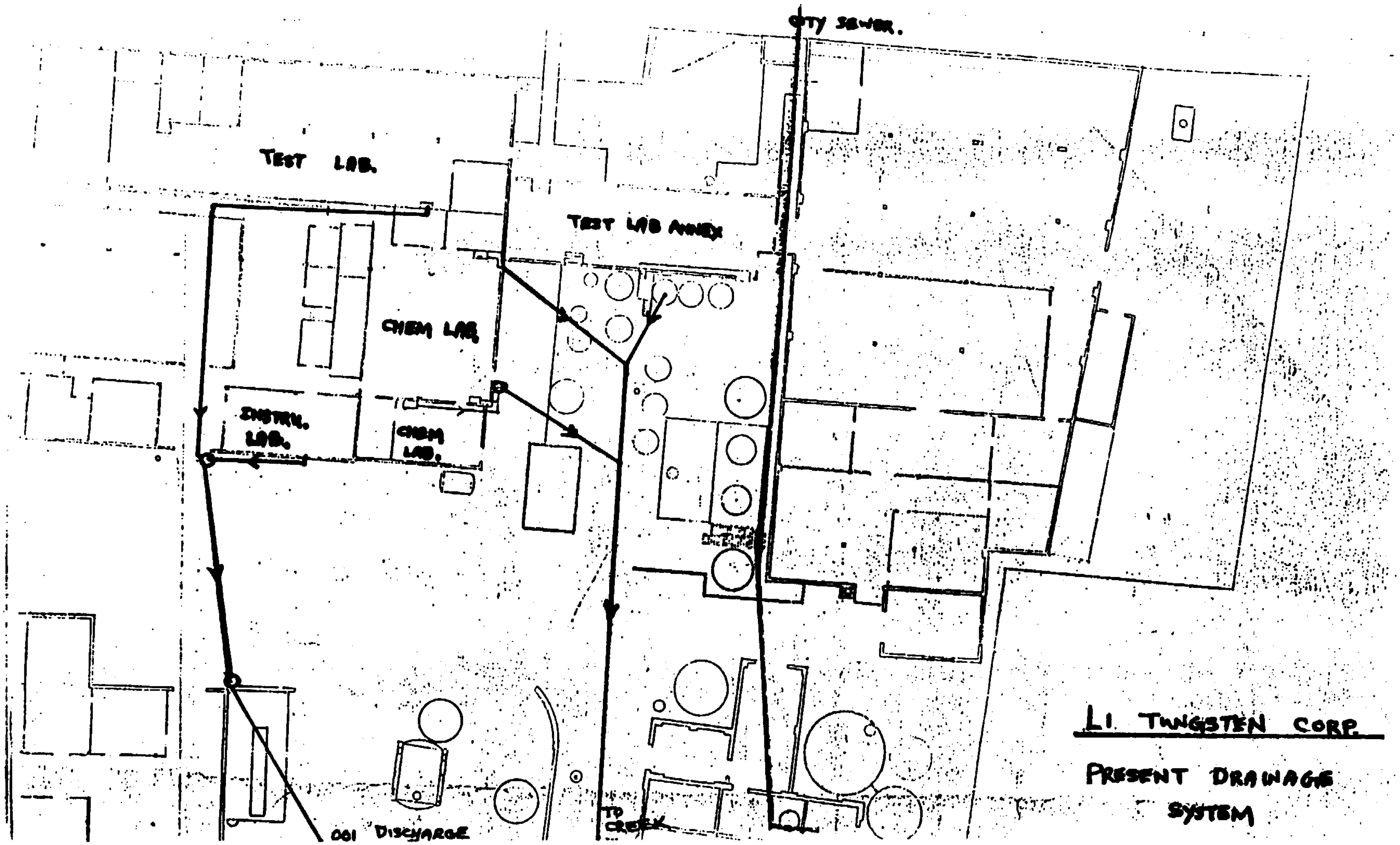
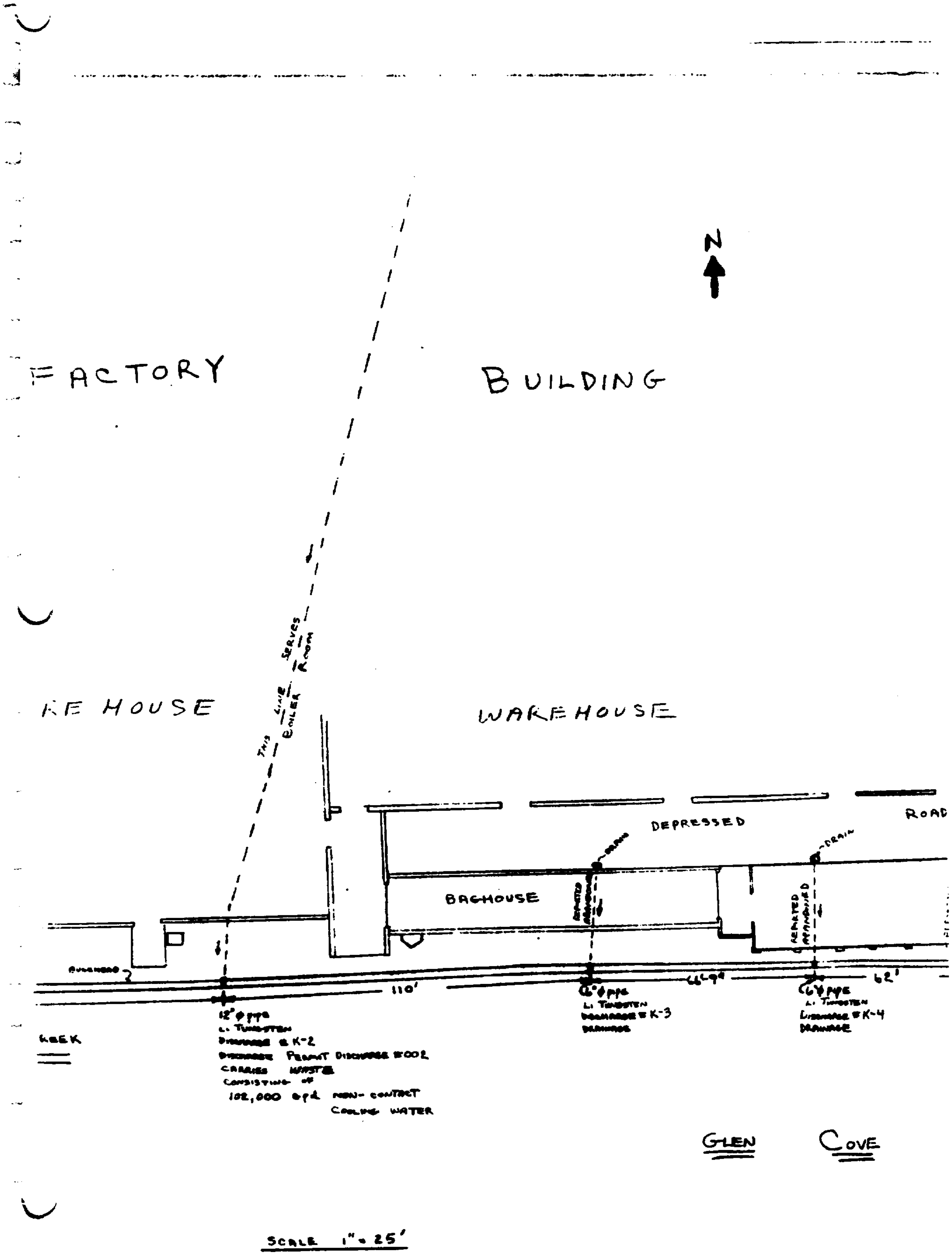

CITY SEWER.
TEST LAB.
TEST LAB ANNEX
CHEM LAB.
INSTRU. LAB.
CHEM LAB.
001 DISCHARGE
TO CREEK
LI TUNGSTEN CORP.
PRESENT DRAINAGE SYSTEM

PLATE 3


N
FACTORY
BUILDING
KE HOUSE
THIS LINE SERVES BOILER ROOM
WAREHOUSE
DEPRESSED
ROAD
DRAIN
BAGHOUSE
110'
62'
12" ϕ pipe
TUNGSTEN
K-2
PERMIT DISCHARGE #002
CARRIES WASTE
CONSISTING OF
102,000 gpd NON-CONTACT
COOLING WATER
K-3
TUNGSTEN
K-4
DRAINAGE
GLEN COVE
SCALE 1" = 25'

100763

REFERENCE NO. 28


CITY OF GLEN COVE
NASSAU COUNTY NEW YORK
HEMPSTEAD HARBOR
MOSQUITO COVE
VILLAGE OF SEA CLIFF
F.E.M.A. COASTAL FLOOD ZONES (COMBINED 100 AND 500 YEAR ZONES)
COASTAL FLOOD ZONES
D.S. Russell

100765

REFERENCE NO. 29

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO:	DATE:	TIME:
02-8907-78	10/23/89	1415

DISTRIBUTION: TO FILE: LI TUNGSTEN

BETWEEN:	OF:	PHONE:
ROBERT THESSIFELD	NASSAU COUNTY DEPT. OF HEALTH	(516) 535-3313

AND: STEVEN OKULEWICZ

DISCUSSION:

I ASKED MR. THESSIFELD ABOUT BACKGROUND RADIATION RESULTS FOR THE LI TUNGSTEN SITE. HE SAID THAT NO ON-SITE RADIATION SURVEYS WERE EVER DONE TO DETERMINE BACKGROUND RADIATION, BUT OFF-SITE SOIL SAMPLES WERE TESTED AND HAD "NEGATIVE RESULTS."

ACTION ITEMS:

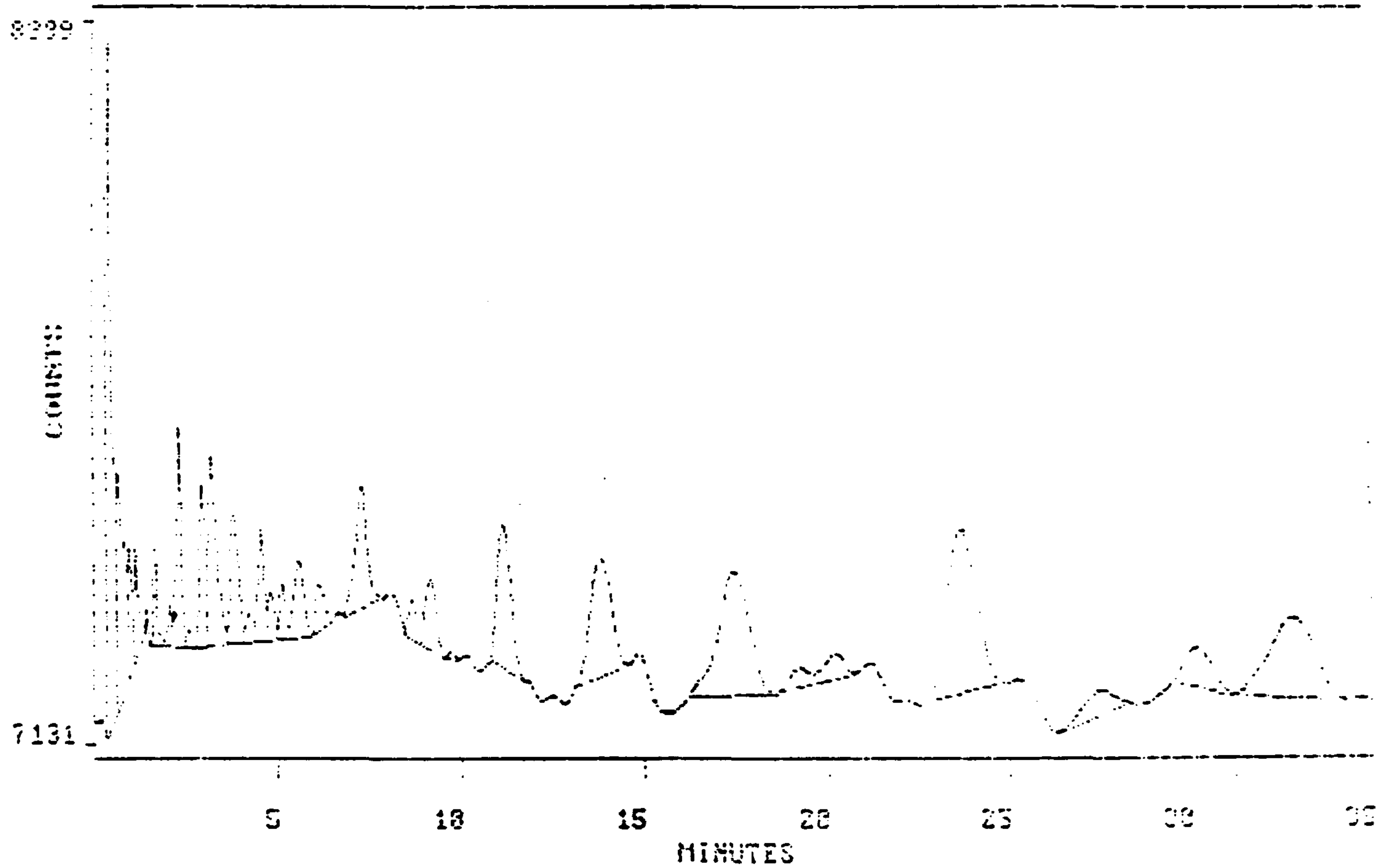
Time:11:12:51   Date:TUE [illegible] SEP [illegible]

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:19:30:57   Date:MON [illegible] SEP [illegible]
Method:A4

Direct Env.   5

FILE: N2455835   SCALE: 1   RANGE (MIN.): [illegible]



100768

Channel #......4   Time:20.06.51   Date:MON 25 SEP 89
Run #2 of 17

Sample name.........DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file.......... D1:N2455005
Method name.........A4

Author.........METHOD 608 /// 8080J JCR
Instrument.....TRACOR 550 w. ECD
Column. 1.5%SP2250/1.95%SP2401
Notes..........
2UL 1G/100ML

Run time.......35.00 min.   Delay time...0.00 min.
Acq. time......19:30:57   Acq. date....MON 25 SEP 89
Start PW.......10.00 sec.   End PW.......30.00 sec.
Slope sens.....2.00 uv/sec.

Area reject....500
peaks found..30

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.426			9.566	11590	1262	BV
2	0.653			4.039	4893	414	VV
3	0.940			1.600	1939	233	VV
4	1.136			1.378	1670	191	VB
5	1.668			0.925	1121	181	BV
6	2.057			0.462	560	83	VV
7	2.348			3.033	3675	391	VB
8	2.951			2.465	2986	287	BV
9	3.192			4.401	5332	333	VV
10	3.808			2.846	3448	233	VV
11	4.186			0.579	702	53	VV
12	4.542			1.900	2302	194	VV
13	4.800			0.815	988	85	VV
14	5.136			0.878	1064	94	VV
15	5.565			2.086	2527	136	VB
16	6.129			1.095	1327	82	BB
17	7.297			3.893	4717	210	BB
18	8.665			1.127	1366	71	BV
19	9.165			2.063	2500	126	VB
20	11.188			5.504	6669	255	BB
21	13.819			7.029	8516	211	BB
22	17.464			10.812	13099	220	BB
23	19.267			1.088	1318	36	BV
24	20.183			1.592	1929	48	VB
25	23.747			13.819	16741	290	BB

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	EE
28	33.875	9.748	11810	143	EE
TOTALE		100.000	121157		

100770

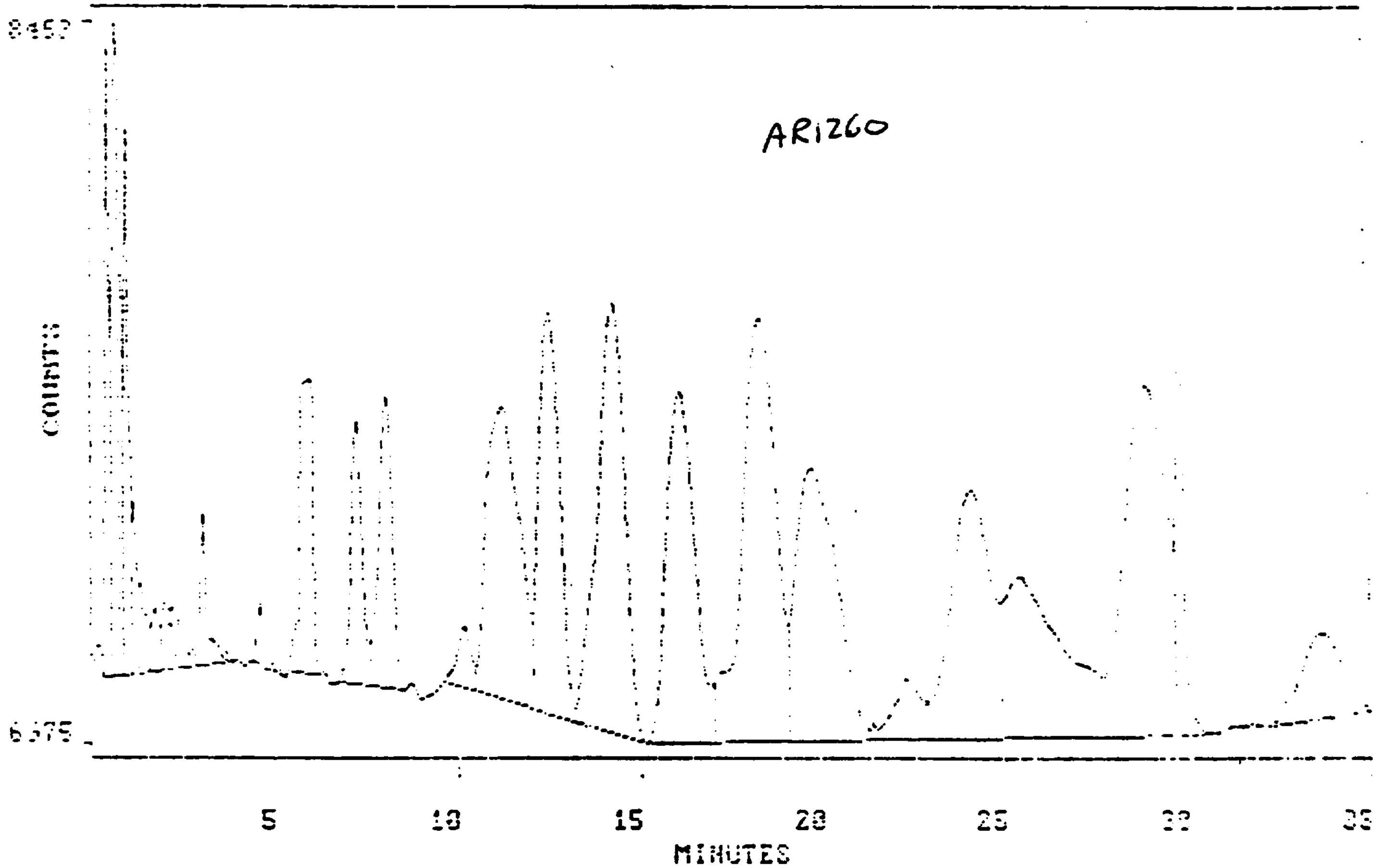
Time:11:16:11 Date:TUE 2[illegible] SEP 9[illegible]

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:20:11:58 Date:MON 2[illegible] SEP 9[illegible]
Method:A4

Direct Env. 6

FILE: [illegible] SCALE: 1 RANGE (MIN.): [illegible] TO [illegible]



Channel #......4   Time.20:47:52   Date:MON 25 SEP 89
Run #3 of 17

Sample name.........DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file D1:N2455006
Method name.........A4

Author..........METHOD 608 /// 80803 JCR
Instrument.....TRACOR 550 w. ECD
Column.......1.5%SP2250/1.95%SP2401
Notes..........
2UL 1G/100ML

Run time ......35.00 min.   Delay time...0.00 min.
Acq. time......20:11:58   Acq. date....MON 25 SEP 89
Start PW.......10.00 sec.   End PW.......30.00 sec.
Slope sens.....2.00 uv/sec.

Area reject....500
peaks found..31

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.218			0.114	595	45	BB
2	0.440			2.013	10480	1308	BV
3	0.639			2.422	12609	1346	VV
4	0.816			0.942	4907	958	VV
5	0.940			2.092	10891	1134	VV
6	1.162			1.042	5427	363	VV
7	1.754			0.331	1726	130	VV
8	2.017			0.507	2640	141	VV
9	2.379			0.268	1393	103	VV
10	3.032			0.738	3843	323	VB
11	4.592			0.245	1277	119	BB
12	5.921			3.046	15858	603	BB
13	7.237			2.318	12070	537	BV
14	8.033			2.915	15179	597	VB
15	10.211			0.670	3487	128	BV
16	11.250			7.139	37175	598	VV
17	12.532			6.209	32329	821	VV
18	14.264			8.849	46078	881	VB
19	16.102			7.338	38208	716	BV
20	18.302			10.747	55961	863	VV
21	19.683			8.257	42995	557	VB
22	22.258			1.200	6250	122	VV
23	24.117			7.464	38863	506	VV
24	25.400			7.200	37488	529	VV
25	28.944			10.999	57272	718	VV

335347

00024

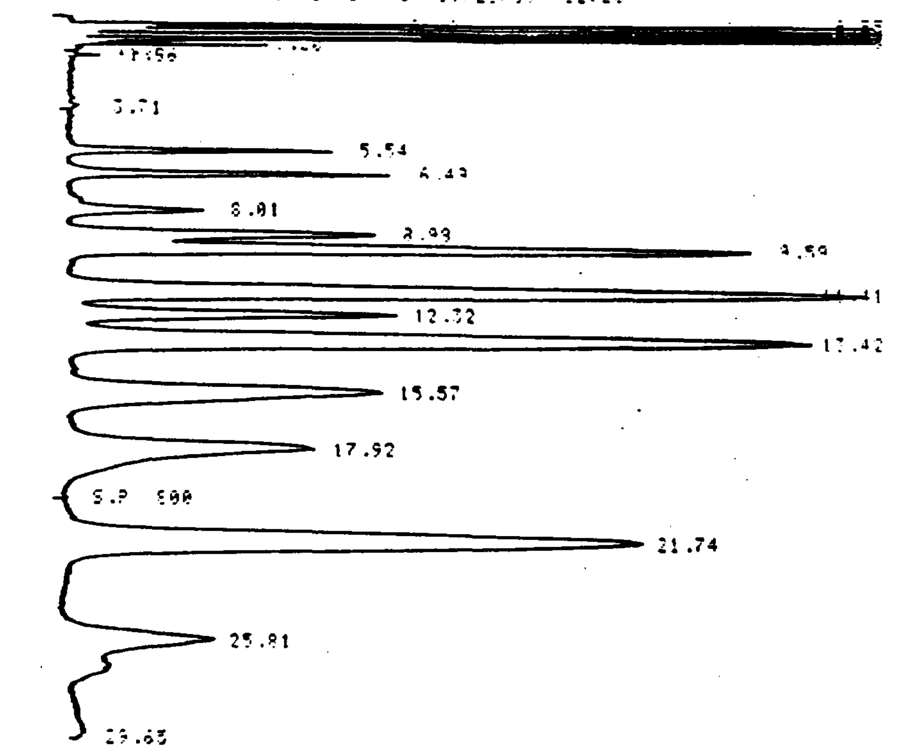
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTALS		100.000	520696	

100773

6

3ul Direct N2455-006 conf.

CH. 1 C.S 5.00 ATT 0 OFFS 0 09/26/89 22:20



AR1260

TEMP: 150 200 C
3% OV-1
6FT:4MM ID ECD
TRACOR 550A -1
METH'S 608 /509B /8080 /8150

D-2000 09/26/89 22:20

SAMPLE: TAG: 30 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.35	5597	1175	0.35	BV	
2	0.46	827	311	0.46	TBB	
3	0.56	12496	1981	0.56	VV	
4	0.74	3764	1312	0.74	VV	
5	0.82	6412	1650	0.82	VV	
6	0.96	4588	1191	0.96	VV	
7	1.20	674	249	1.20	VB	
11	5.54	2972	328	5.54	BB	
12	6.49	4949	406	6.49	BB	
13	8.01	2494	162	8.01	BB	
14	8.98	7867	383	8.98	BV	
15	9.59	19886	859	9.59	VB	
16	11.41	31210	1006	11.41	BV	
17	12.32	8113	394	12.32	TBB	
18	13.42	32395	935	13.42	VB	
19	15.57	14890	385	15.57	BB	
20	17.92	17990	304	17.92	BB	
21	21.74	32349	718	21.74	BB	
22	25.81	10916	184	25.81	BB	
23	29.65	594	14	29.65	BB	
TOTAL		216173	13947			

PEAK REJ : 299

RAW DATA STORAGE NO. 43

100774

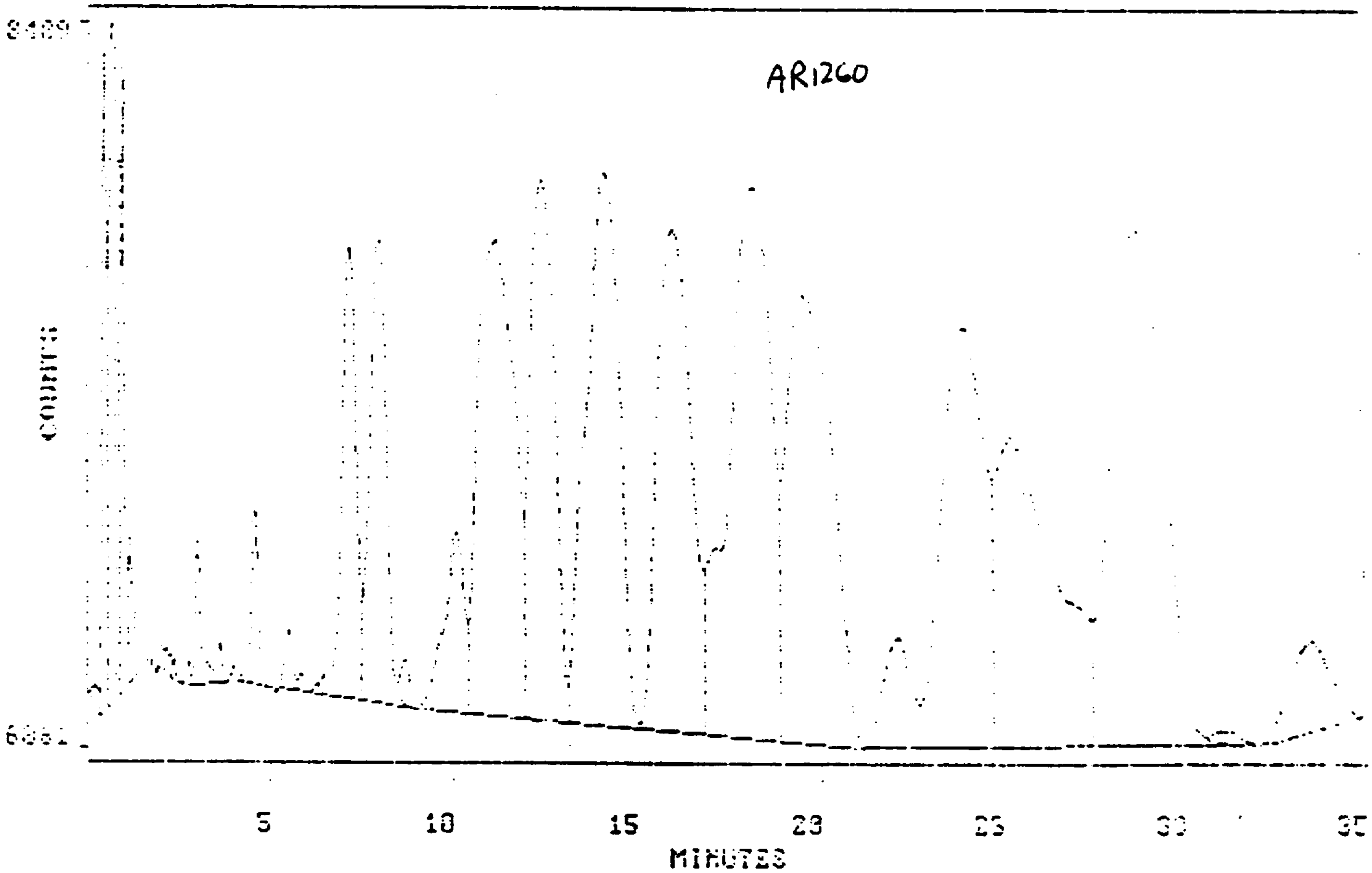
RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:11:18:27 Date TUE 26 SEP 89

Time:20:52:59 Date MON 25 SEP 89
Method:A4

Direct Env. 7

FILE: N24SEP07 SCALE: 1 RANGE (MIN.): 0.00 TO 35.00



100775

Channel #......4   Time 21 28:53   Date MON 25 SEP 89
Run #4 of 17

Sample name.........DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file...........D1:N2455007
Method name.........A4

Author..........METHOD 608 /// 80803 JCR
Instrument... TRACOR 550 w. ECD
Column..........1.5%SP2250/1.95%SP2401
Notes..........
2UL 1G/100ML

Run time ....35.00 min.   Delay time...0.00 min.
Acq. time.......20:52:59   Acq. date....MON 25 SEP 89
Start PW........10.00 sec.   End PW.......30.00 sec.
Slope sens......2.00 uv/sec.

Area reject....500
peaks found..32

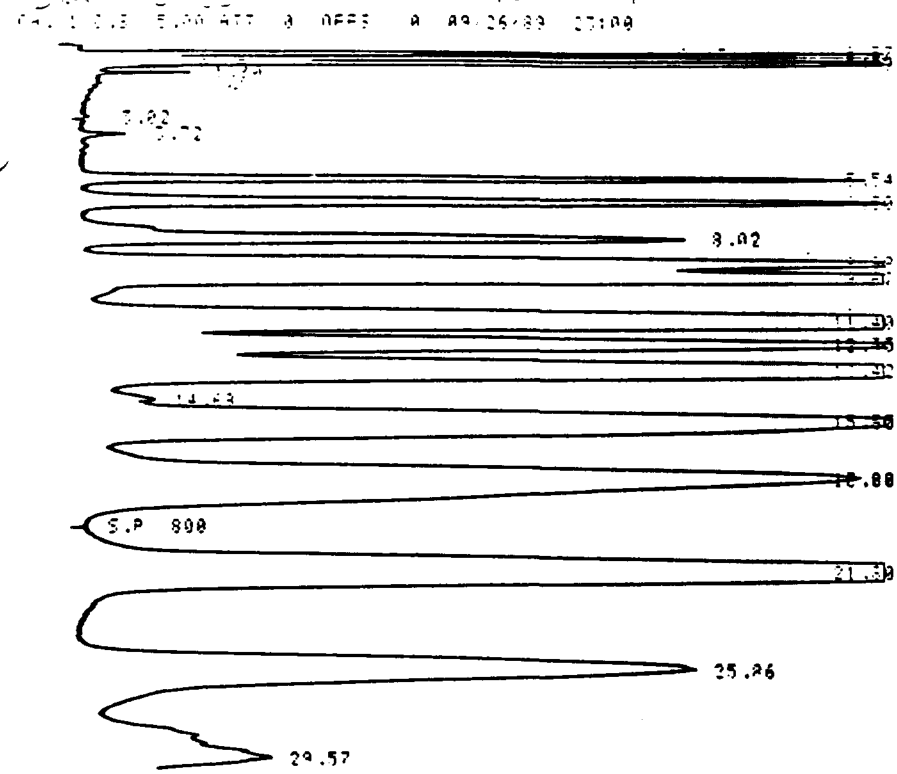
AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.253			0.071	648	54	BB
2	0.441			1.455	13269	1498	BV
3	0.639			1.720	15683	1533	VV
4	0.815			0.826	7533	1331	VV
5	0.935			1.153	10512	1399	VV
6	1.165			0.383	3490	326	VE
7	2.162			0.064	582	57	VV
8	3.015			0.399	3635	326	VV
9	3.642			0.082	749	88	VE
10	4.574			0.596	5438	394	EE
11	5.483			0.215	1965	132	BV
12	5.838			0.058	530	41	VV
13	7.192			3.088	28154	1009	VV
14	7.988			3.562	32480	1042	VE
15	8.708			0.192	1749	108	EE
16	10.125			1.660	15140	409	EV
17	11.208			8.084	73712	1063	VV
18	12.454			6.187	56417	1209	VV
19	14.133			8.564	78093	1240	VV
20	16.031			7.887	71913	1127	VV
21	18.183			11.007	100366	1238	VV
22	19.558			9.450	86165	1005	VB
23	22.157			1.440	13127	245	BV
24	24.000			8.225	75000	939	VV
25	25.267			8.689	79229	692	VV

634022

27	31.117	0.145	1334	15	EE
28	33.550	1.768	16124	202	EE
TOTALS		100.000	911838		

N2455-007



ARI260

TEMP: ISO 200 C
3% OV-1
6FT:4MM ID ECD
TRACOR 560A -1
METH'S 608 /5098 /8080 /8150

D-2000 09/26/89 23:00

SAMPLE: TAG: 91 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.37	7529	1726	0.37	RU	
2	0.45	2480	750	0.45	UU	
3	0.56	15469	2009	0.56	UU	
4	0.74	4116	1633	0.74	UU	
5	0.82	9866	1845	0.82	UU	
7	1.20	706	114	1.20	TBB	
9	3.72	410	54	3.72	BB	
10	5.54	13265	993	5.54	BB	
11	6.50	18567	1061	6.50	BB	
12	8.02	14748	717	8.02	BB	
13	8.98	29274	1086	8.98	BU	
14	9.62	43076	1419	9.62	UB	
15	11.40	62471	1495	11.40	BU	
16	12.35	73527	1051	12.35	UU	
17	12.40	1340	56	12.40	TBB	
18	13.42	63545	1409	13.42	UB	
19	14.68	401	29	14.68	BB	
20	15.55	53558	1044	15.55	BU	
21	15.60	6588	36	15.60	TBB	
22	17.88	69456	969	17.88	BU	
23	18.00	3184	25	18.00	TBB	
24	21.80	85388	1344	21.80	BB	
25	25.86	49384	768	25.86	BB	
26	29.57	9936	150	29.57	BB	
TOTAL		602834	21843			

PEAK REJ : 299

RAW DATA STORAGE NO **

100778

RECONSTRUCT SCREEN DUMP
Data Acquisition

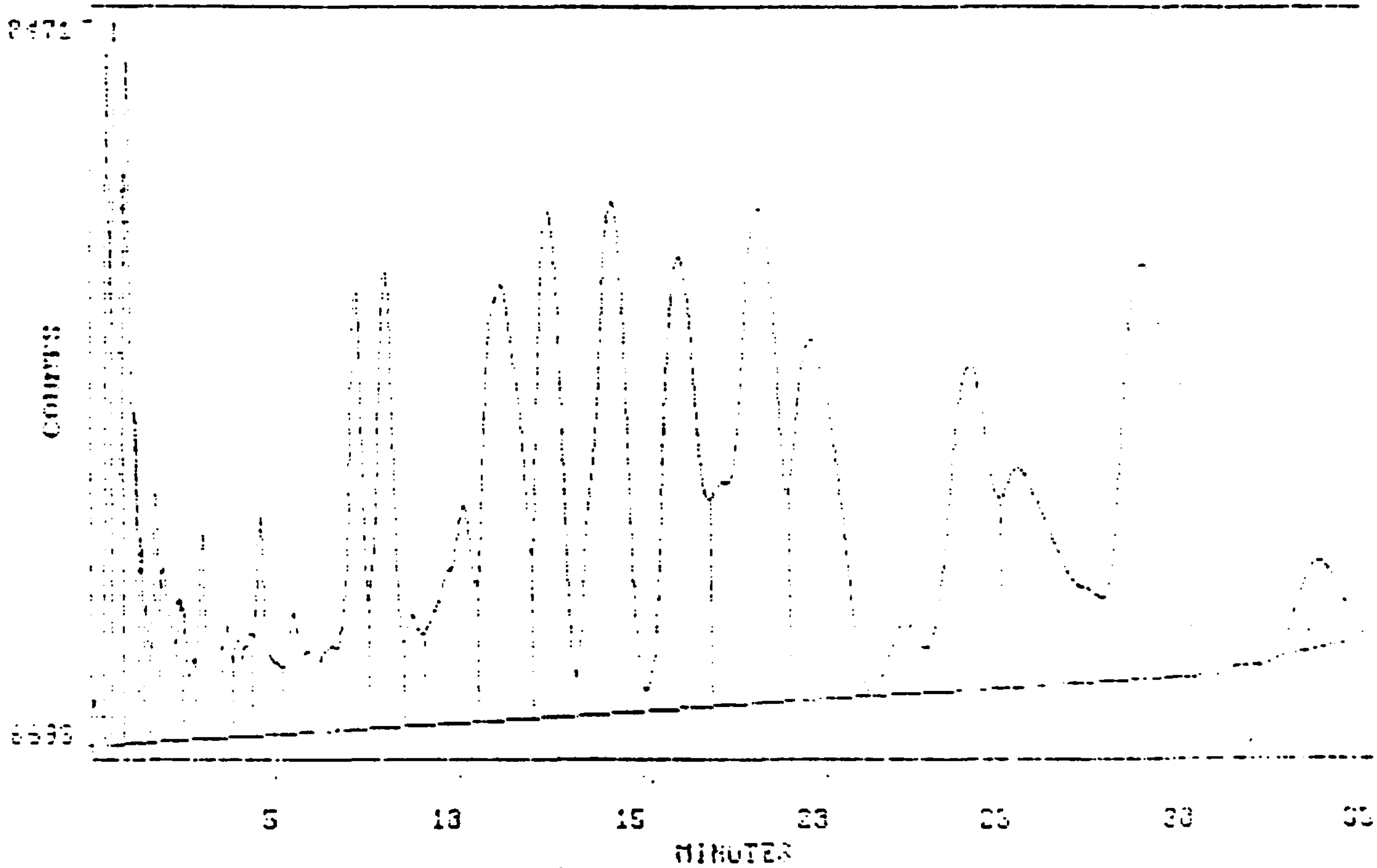
Time:11:23.36 Date:TUE 26 SEP 89

Time:21:34:00 Date:MON 25 SEP 89

Method:A4

Direct Env. 8

FILE: N2455086 SCALE: 1 RANGE (MIN.): 0.00 TO 35.00



ERROR: :Unknown command

Channel # .....4 Time:22:09:52 Date:MON 25 SEP 89
Run #5 of 17

Sample name..........DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file...........D1:N2455008
Method name..........A4

Author ....METHOD 608 /// 80803 JCR
Instrument.....TRACOR 550 w. ECD
Column.........1.5%SP2250/1.95%SP2401
Notes..........
2UL 1G/100ML

Run time.........35.00 min. Delay time...0.00 min.
Acq. time.......21:34:30 Acq. date....MON 25 SEP 89
Start PW.......10.00 sec. End PW.......30.00 sec.
Slope sens.....2.00 uv/sec.

Area reject....500
peaks found..36

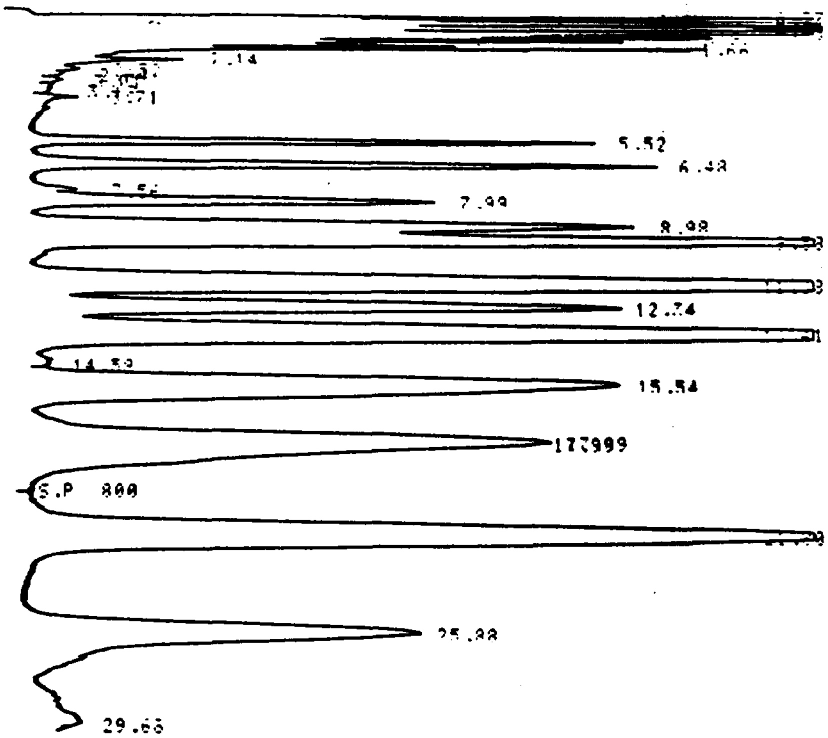
AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.225			0.083	803	72	BB
2	0.441			1.512	14671	1722	BV
3	0.640			1.903	18465	1778	VV
4	0.819			0.916	8889	1496	VV
5	0.957			2.325	22564	1698	VV
6	1.235			0.505	4903	812	VV
7	1.379			0.341	3312	502	VV
8	1.508			0.294	2849	333	VV
9	1.759			0.719	6980	639	VV
10	1.961			0.834	8098	431	VV
11	2.432			0.368	3574	345	VV
12	2.538			0.303	2936	323	VV
13	2.801			0.164	1591	198	VV
14	3.023			0.739	7175	527	VV
15	3.317			0.448	4352	248	VV
16	3.665			0.443	4300	289	VV
17	4.013			0.392	3808	244	VV
18	4.287			0.374	3634	259	VV
19	4.594			1.421	13795	534	VV
20	5.500			1.166	11312	302	VV
21	6.554			0.647	6275	213	VV
22	7.222			3.279	31826	[illegible]081	VV
23	8.022			3.862	37480	1123	VV
24	8.758			0.824	7995	274	VV
25	10.158			3.324	32263	530	VV

27	12.517	[illegible]	[illegible]	[illegible]	[illegible]
28	14.253	7.846	76143	1259	VV
29	16.085	7.583	73592	1112	VV
30	18.286	10.721	104049	1220	VV
31	19.650	7.436	72166	690	VV
32	22.300	1.169	11344	181	VV
33	24.100	6.548	63551	802	VV
34	25.356	6.330	61432	542	VV
35	28.867	10.021	97251	1023	VE
36	33.650	1.796	17434	216	EE
TOTALE		100.000	970483		

3ul Direct S N2455-008 1g/xml

CH. 1 C.S 5.00 ATT 0 OFFS 0 09/26/89 23:40



TEMP: ISO 200 C
3% OV-1
6FT:4MM ID ECD
TRACOR 550A -1
METH'S 608 /509B /8080 /8150

D-2000 09/26/89 23:40

SAMPLE: TAG: 92 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: A CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.37	9770	1572	0.37	BU	
2	0.46	1002	750	0.46	TBB	
3	0.56	15275	2004	0.56	UU	
4	0.74	6227	1607	0.74	UU	
5	0.82	8992	1807	0.82	UU	
6	0.95	14422	1904	0.95	UU	
7	1.11	2245	651	1.11	UU	
9	1.19	4502	859	1.19	UU	
9	1.33	5319	750	1.33	UU	
10	1.52	3937	533	1.52	UU	
11	1.66	7144	852	1.66	UU	
12	2.14	2114	189	2.14	UU	
13	2.52	662	59	2.52	UU	
14	2.64	469	41	2.64	UU	
15	3.01	473	37	3.01	UU	
16	3.18	490	25	3.18	UB	
17	3.71	473	43	3.71	BB	
18	5.52	8543	713	5.52	BB	
19	6.48	12348	795	6.48	BB	
20	7.56	622	53	7.56	BU	
21	7.99	9617	505	7.99	UB	
22	8.98	18339	759	8.98	BU	
23	9.58	33286	1213	9.58	UB	
24	11.38	47346	1304	11.38	BU	
25	12.34	20527	741	12.34	UU	
26	13.41	50064	1238	13.41	UB	
27	14.58	365	18	14.58	BB	
28	15.54	36733	734	15.54	BB	
29	17.39	40246	651	17.89	BU	
31	21.80	57106	1048	21.80	BB	
32	25.88	28324	492	25.88	BB	
33	29.68	368	28	29.68	BB	
TOTAL		447200	23575			

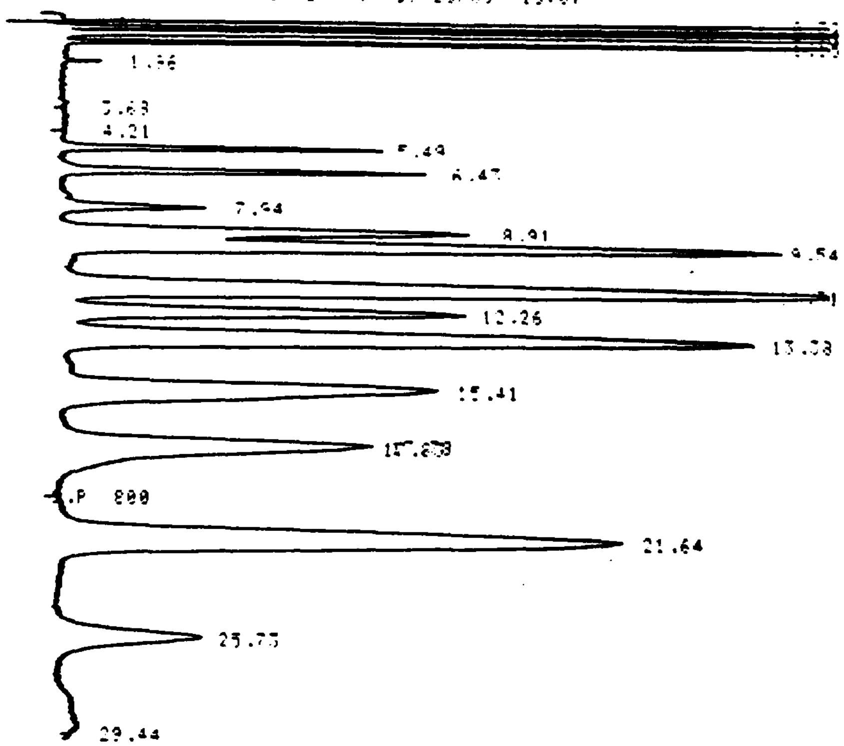
PEAK REJ : 299

RAW DATA STORAGE NO. 45

100782

Hul Direct Env. N2455-009 1g./10ml 1:10,000

CH. 1 C.S 5.00 ATT 0 OFFS 0 09/26/89 13:07



AR1260

TEMP: 150 200 C
3% OV-1
6FT:4MM ID ECD
TRACOR 550A -1
METH'S 608 /5030 /8080 /8150

D-2000 09/26/89 13:07

SAMPLE: TAB: 83 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.32	5103	1622	0.32	BB	
2	0.44	354	111	0.44	BU	
3	0.54	12944	2008	0.54	UU	
4	0.73	4563	1541	0.73	UU	
5	0.81	17814	2000	0.81	UU	
6	1.15	10017	1914	1.15	UB	
9	4.21	802	19	4.21	BB	
10	5.49	3659	410	5.49	BB	
11	6.43	5317	463	6.43	BB	
12	7.94	2550	180	7.94	BB	
13	8.91	10972	516	8.91	BU	
14	9.54	21417	907	9.54	UB	
15	11.31	33052	1003	11.31	BU	
16	12.26	11258	493	12.26	TBB	
17	13.38	29994	871	13.38	UB	
18	15.41	19797	468	15.41	BB	
19	17.73	16599	391	17.78	BU	
20	17.83	632	23	17.83	TBB	
21	21.64	32742	707	21.64	BB	
22	25.73	7029	180	25.73	BB	
23	29.44	1772	21	29.44	BB	
TOTAL		242486	15748			

174465

PEAK REJ : 299

RAW DATA STORAGE NO. 36

100783

RECONSTRUCT SCREEN DUMP
Data Acquisition

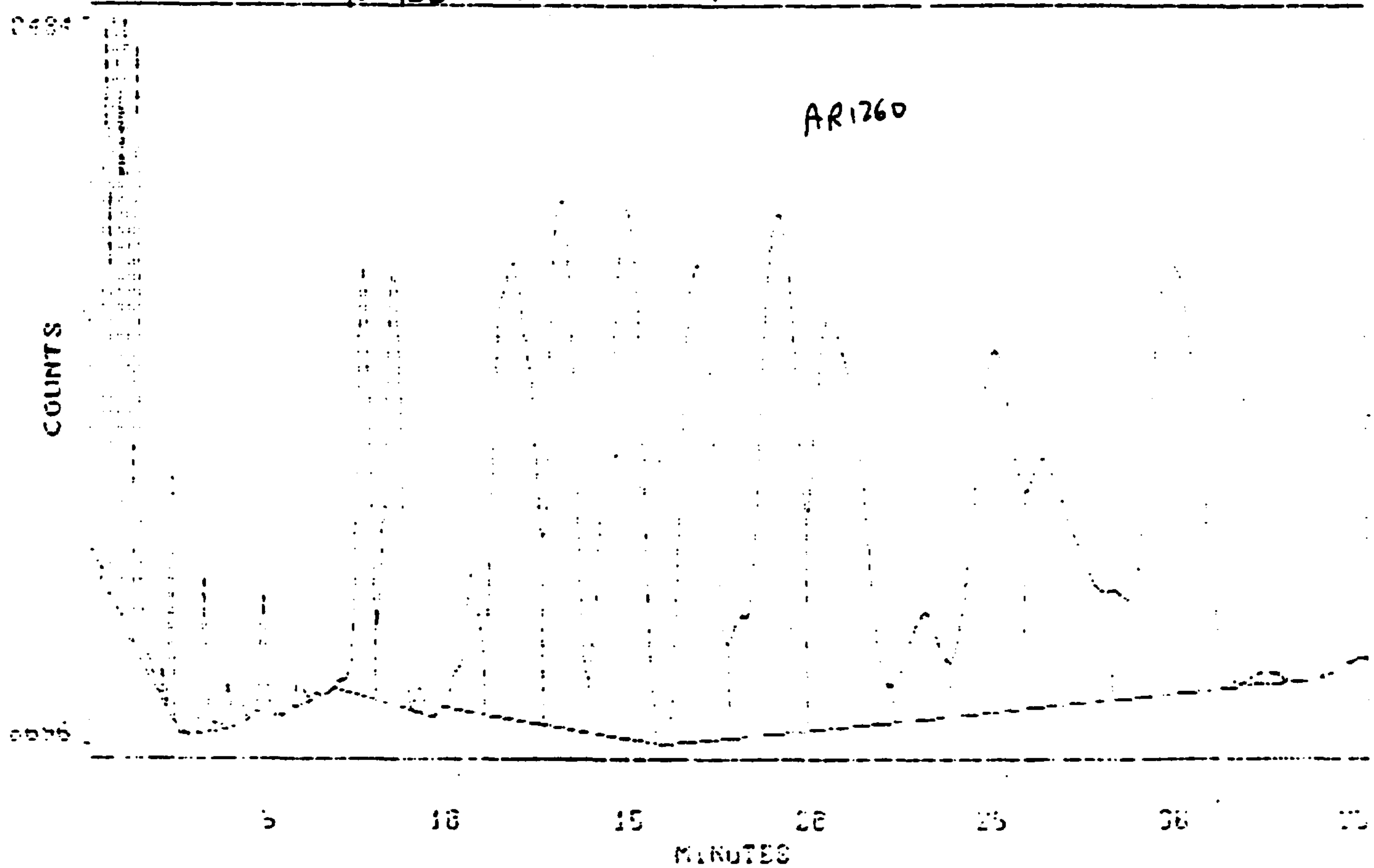
Time: 10.27.53 Date: WED 27 SEP 89

Time: 22:56:16 Date: TUE 26 SEP 89

Method: A4

Direct 9

FILE: C4SPL884 N2455-009 SCALE: 1 conf. run RANGE (MIN.): 0.02 TO 35.98



100784

100785

Channel #......4   Time.23.32.11   Date TUE 26 SEP 89
Run #4 of 25

Sample name ...... (var log p 38)
Data file D1 C4SPL004
Method name A4

Author ......METHOD 608 /// 80803 JCR
Instrument ....TRACOR 550 w. ECD
Column 1.5%SP2250/1.95%SP2401
Notes..........
4UL   1g/100ml , 1:10,000 dilution

Run time.......35.00 min.   Delay time... 0.00 min.
Acq. time......22.55 16   Acq. date....TUE 26 SEP 89
Start PW.......10.00 sec.   End PW.......30.00 sec.
Slope sens.....2.00 uv/sec.

Area reject....500
peaks found..29

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.432			1.471	13281	1394	BV
2	0.642			1.800	16254	1449	VV
3	0.825			0.804	7260	1307	VV
4	0.951			2.013	18171	1499	VV
5	1.293			1.670	15075	1494	VB
6	2.220			0.471	4252	670	BB
7	2.878			0.056	506	69	BV
8	3.099			0.376	3398	383	VV
9	3.745			0.119	1071	112	VB
10	4.692			0.387	3493	290	BB
11	5.658			0.114	1028	66	BV
12	7.398			2.931	26460	1055	BV
13	8.212			3.572	32255	1084	VB
14	8.925			0.110	992	62	BB
15	10.417			1.259	11369	348	BV
16	11.533			8.830	79721	1127	VV
17	12.846			6.762	61052	1298	VV
18	14.625			9.088	82052	1302	VB
19	16.525			7.823	70632	1177	BV
20	18.767			10.707	96675	1278	VV
21	20.183			10.143	91583	1014	VV
22	22.807			1.961	17706	263	VV
23	24.750			7.997	72204	992	VV
24	26.050			7.012	63310	615	VV
25	29.700			12.348	111487	1059	VB

00037

TOTALE 100.000 931893

==

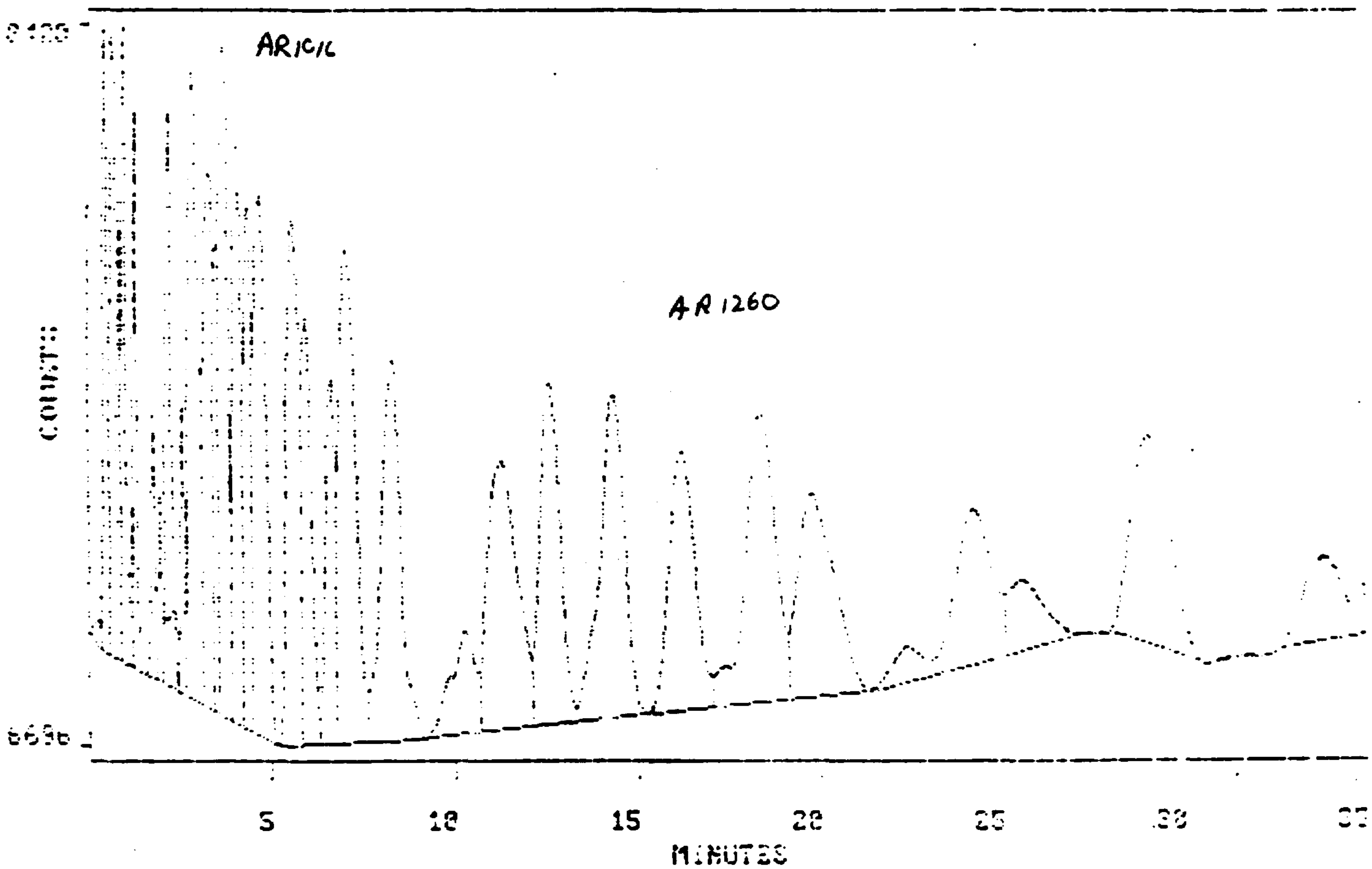
Time:11:26:16 Date:TUE 2[illegible] SEP 89

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:22:56:02 Date:MON 25 SEP 89
Method:A4

Direct Env. 10

FILE: [illegible] SCALE: 1 RANGE [illegible]



100787

Channel #......4 Time:23.31.55 Date MON 25 SEP 89
Run #7 of 17

Sample name.........DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file. D1:N2455010
Method name.........A4

Author.........METHOD 608 /// 80803 JCR
Instrument.....TRACOR 550 w. ECD
Column.........1.5%SP2250/1.95%SP2401
Notes..........
2UL 1G/100ML

Run time.......35.00 min. Delay time...0.00 min.
Acq. time......22:56:02 Acq. date....MON 25 SEP 89
Start PW.......10.00 sec. End PW........30.00 sec.
Slope sens.....2.00 uv/sec.

Area reject....500
peaks found..36

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.268			0.105	724	61	BB
2	0.446			1.827	12596	1494	BV
3	0.648			2.048	14119	1482	VV
4	0.825			0.784	5404	1124	VV
5	0.948			1.737	11977	1523	VV
6	1.182			0.269	1852	380	VV
7	1.287			1.380	9517	1351	VV
8	1.777			0.618	~~4257~~	632	VV
9	1.938			0.415	2862	483	VV
10	2.200			2.299	15850	1379	VE
11	2.398			0.133	915	124	EV
12	2.595			0.769	5298	689	VV
13	2.837			4.077	28105	1520	VV
14	3.312			3.101	21377	1294	VV
15	3.504			1.129	7781	1125	VV
16	3.703			3.955	27268	1603	VV
17	4.065			3.133	21601	1388	VV
18	4.356			2.504	17263	1252	VV
19	4.688			4.414	30433	1289	VE
20	5.569			4.358	30041	1248	EV
21	5.945			2.631	18138	1015	VV
22	6.631			2.311	~~1593[illegible]~~	877	VV
23	7.054			5.370	37017	1172	VV
24	8.303			4.885	33675	906	VE
25	10.296			1.595	10996	243	EV

242862

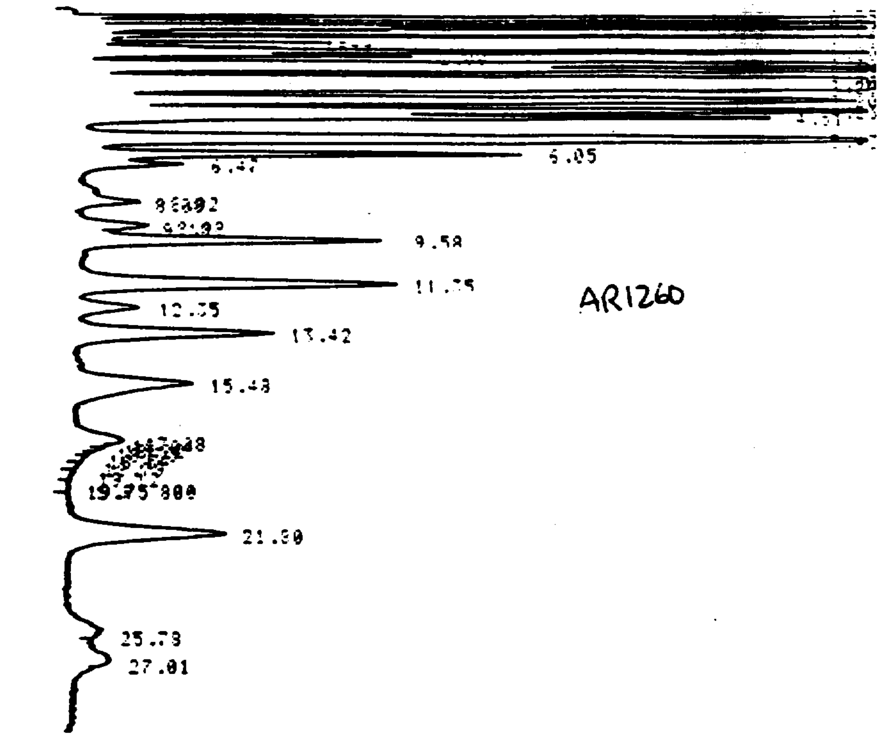
00040

27	[illegible]	4.530	[illegible]	[illegible]	[illegible]
28	14.375	5.313	36630	769	VE
29	16.235	4.468	30905	619	EV
30	18.418	5.846	40299	690	VV
31	19.792	4.938	34039	490	VE
32	22.400	0.753	5191	87	EV
33	24.283	3.744	25813	370	VV
34	25.600	1.691	11657	171	VE
35	29.133	5.366	36991	499	EE
36	33.933	2.184	15059	203	EE
TOTALE		100.000	689388		

252342

3ul Direct N2455-010 | 3 ... conf.

CH. 1 C.S 5.00 ATT 0 OFFS 0 09/27/89 00:20



AR1016

AR1260

TEMP: ISO 200 C
3% OV-1
6FT:4MM ID ECD
TRACOR 550A -1
METH'S 608 /5098 /8080 /8150

D-2000 09/27/89 00:20

SAMPLE: TAG: 93 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	PRT	BC	NAME
1	0.35	5027	1087	0.35	BU	
2	0.56	10019	1843	0.56	UU	
3	0.74	2255	1072	0.74	UU	
4	0.82	10413	1891	0.82	UU	
5	0.95	696	301	0.95	T2B	
6	1.16	7593	1548	1.16	UU	
7	1.44	1366	319	1.44	UU	
8	1.65	1110	252	1.65	UU	
9	1.80	10541	1480	1.80	UU	
10	2.00	3154	423	2.00	UU	
11	2.30	17481	1694	2.30	UU	
12	2.55	14439	1559	2.55	UU	
13	3.00	27700	1815	3.00	UU	
14	3.20	25180	1499	3.20	UU	
15	3.80	18003	990	3.80	UU	
16	4.23	15647	1142	4.23	UU	
17	4.51	11076	880	4.51	UU	
18	5.43	21958	1069	5.43	UU	
19	6.05	7359	561	6.05	UU	
20	6.47	2206	131	6.47	UB	
21	8.02	788	60	8.02	BU	
23	8.98	1319	83	8.98	BU	
25	9.58	6983	377	9.58	UB	
26	11.35	9844	404	11.35	BB	
27	12.35	1690	75	12.35	BB	
28	13.42	5974	246	13.42	BB	
29	15.48	5232	144	15.48	BB	
30	17.88	1218	56	17.88	BU	
32	18.22	497	36	18.22	UU	
36	19.12	334	17	19.12	BB	
37	19.75	352	15	19.75	BB	
38	21.80	6649	191	21.80	BB	
39	25.78	956	27	25.78	BB	
40	27.01	1154	30	27.01	BB	
TOTAL		256905	23325			

PEAK REJ : 299

RAW DATA STORAGE NO. 46

100790

/80

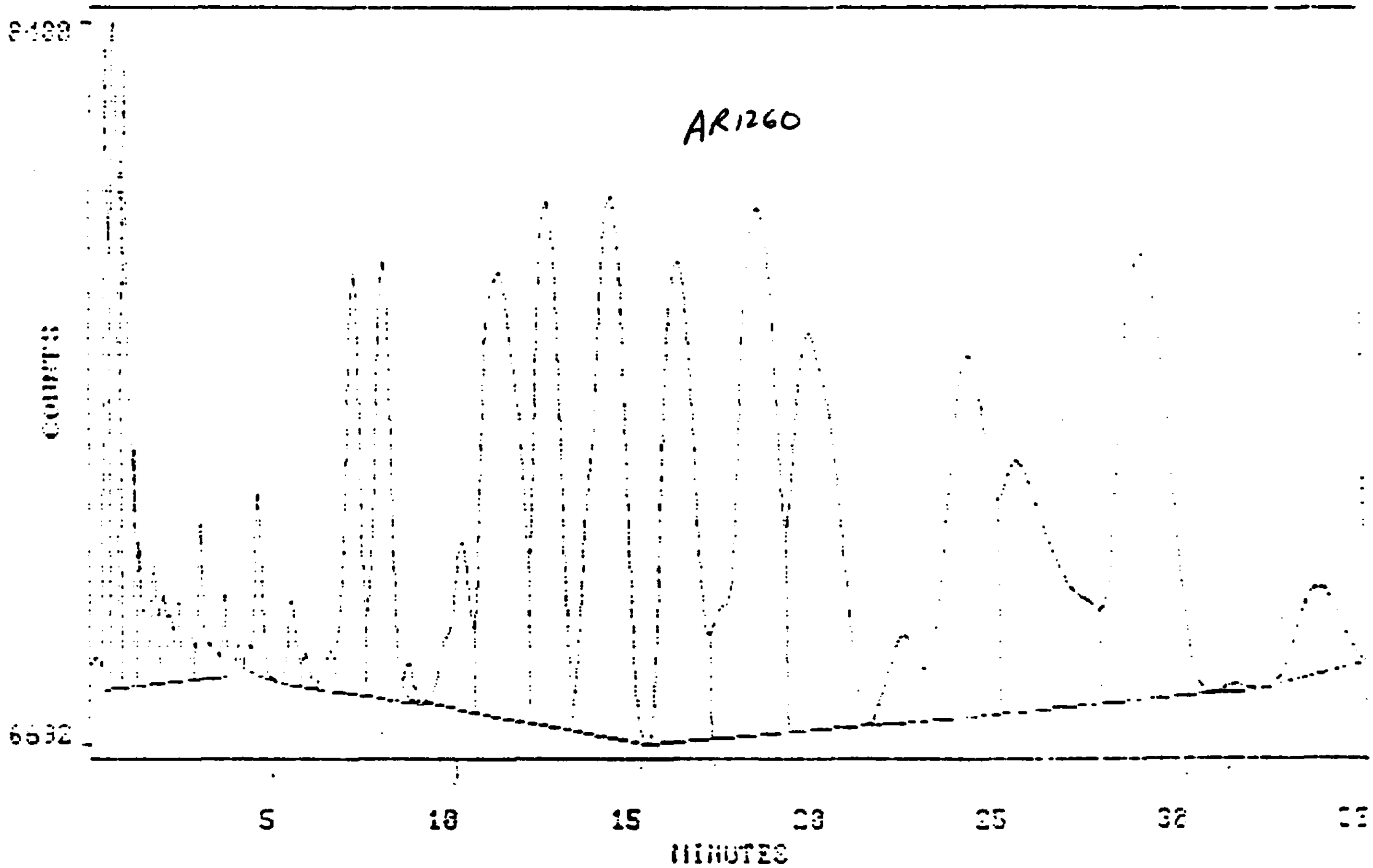
Time:11:28:33   Date:TUE 26 SEP 89

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:23:37:03   Date:MON 25 SEP 89
Method:A4

Direct Env.   11

FILE: M2455811   SCALE: 1   RANGE (MIN.): [illegible] TO [illegible]



100791

Channel #......4   Time:00:12:57   Date:TUE 26 SEP 89
Run #8 of 17

Sample name.........DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file...........D1:N2455011
Method name.........A4

Author.........METHOD 608 /// 8080J JCR
Instrument.....TRACOR 550 w. ECD
Column........ 1.5%SP2250/1.95%SP2401
Notes..........
2UL 1G/100ML

Run time ....35.00 min.   Delay time...0.00 min.
Acq. time.......23:37:03   Acq. date....MON 25 SEP 89
Start PW........10.00 sec.   End PW.......30.00 sec.
Slope sens.....2.00 uv/sec.

Area reject....500
peaks found..35

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.442			1.558	14349	1606	BV
2	0.641			1.865	17180	1652	VV
3	0.820			0.868	7991	1410	VV
4	0.945			2.076	19120	1529	VV
5	1.241			0.370	3411	591	VV
6	1.382			0.404	3717	361	VV
7	1.765			0.362	3331	307	VV
8	2.013			0.280	2583	221	VV
9	2.168			0.191	1760	171	VV
10	2.422			0.252	2319	198	VV
11	2.812			0.092	847	120	VV
12	3.026			0.582	5356	405	VV
13	3.677			0.210	1931	211	VB
14	4.319			0.064	593	60	BV
15	4.602			0.688	6336	445	VB
16	5.514			0.371	3419	213	BV
17	5.888			0.150	1377	89	VV
18	6.566			0.222	2045	108	VV
19	7.238			3.111	28656	1045	VV
20	8.037			3.636	33493	1088	VB
21	8.720			0.168	1544	92	BB
22	10.175			1.721	15848	419	BV
23	11.242			8.168	75231	1100	VV
24	12.550			6.405	58991	1300	VV
25	14.298			8.889	81871	1343	VB

00044

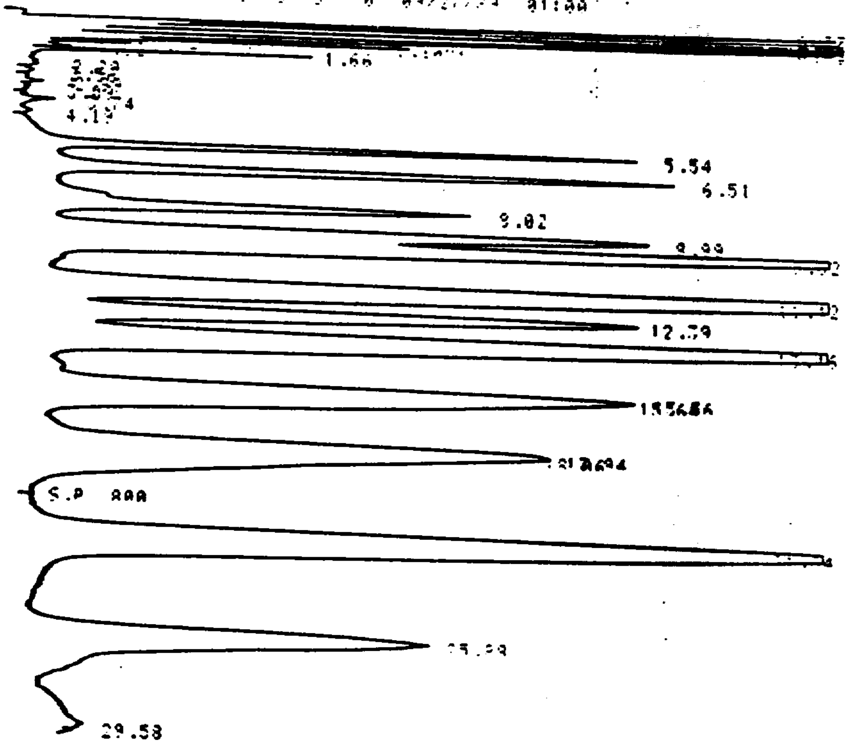
27	18.317	10.6[illegible]	[illegible]	110[illegible]	VV
28	19.692	8.581	79032	980	VV
29	22.267	1.345	12384	217	VV
30	24.133	7.840	72208	893	VV
31	25.433	7.677	70708	618	VV
32	28.967	11.565	106521	1102	VE
33	31.383	0.073	672	20	EE
34	33.778	1.859	17122	217	EE
TOTALS		100.000	921054		

619531

100793

3µl Direct 1' N2455-011

CH. 1 C.S 5.00 ATT 0 OFFS 0 09/27/89 01:00



AR1260

TEMP: ISO 200 C
3% OV-1
6FT:4MM ID ECD
TPACOR 550A -1
METH'S 608 /5098 /8080 /8150

D-2000

09/27/89 01:00

SAMPLE: TAG: 94 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: A CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.37	7776	1571	0.37	BU	
2	0.46	1093	384	0.46	TBB	
3	0.56	13733	1996	0.56	UU	
4	0.74	4954	1536	0.74	UU	
5	0.82	7721	1768	0.82	UU	
6	0.95	6636	1622	0.95	UU	
7	1.02	1690	502	1.02	UU	
8	1.12	823	234	1.12	UU	
9	1.20	1624	481	1.20	UU	
10	1.34	626	129	1.34	UU	
11	1.52	352	55	1.52	UB	
12	1.66	1479	360	1.66	BB	
17	3.74	798	50	3.74	PB	
19	5.54	9209	747	5.54	PB	
20	6.51	11932	779	6.51	BB	
21	8.02	11142	528	8.02	BB	
22	8.99	18692	756	8.99	BU	
23	9.62	33198	1215	9.62	UB	
24	11.42	47834	1310	11.42	BU	
25	12.39	20974	743	12.39	UU	
26	13.46	47918	1225	13.46	UB	
27	15.56	33483	734	15.56	BU	
28	15.64	3048	40	15.64	TBB	
29	17.94	38696	631	17.94	BU	
31	21.84	59208	1071	21.84	PB	
32	25.89	29270	504	25.98	PB	
33	29.58	2234	34	29.58	BB	
TOTAL		416155	21006			

PEAK REJ : 299

RAW DATA STORAGE NO. 47

100794

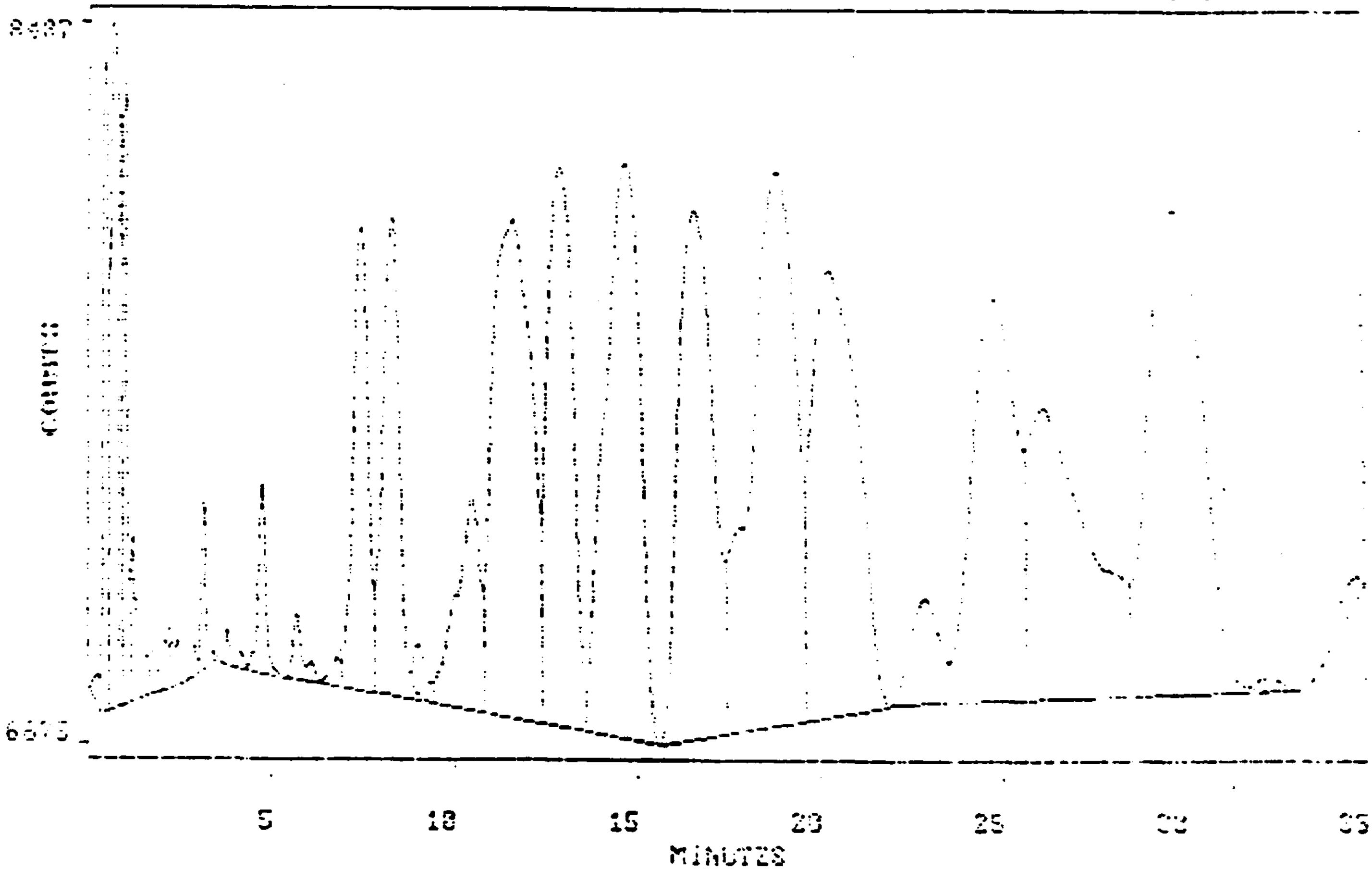
RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:11:30:50 Date:TUE 26 SEP 89

Time:00:18:04 Date:TUE 26 SEP 89
Method:A4

Direct Env. 12

FILE: N0455012 SCALE: 1 RANGE (MIN.): 0.00 TO 35.00



100795

Channel #......4   Time.00:54:02   Date:TUE 26 SEP 89
Run #9 of 17

Sample name.........DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file...........D1:N2455012
Method name.........A4

Author.........METHOD 608 /// 80803 JCR
Instrument ..TRACOR 550 w. ECD
Column.........1.5%SP2250/1.95%SP2401
Notes..........
2UL 1G/100ML

Run time.......35.00 min.   Delay time...0.00 min.
Acq. time .....00:18:04   Acq. date...TUE 26 SEP 89
Start PW.......10.00 sec.   End PW......30.00 sec.
Slope sens.....2.00 uv/sec.

Area reject....500
peaks found..34

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.275			0.098	1038	82	BB
2	0.456			1.471	15532	1679	BV
3	0.658			1.852	19559	1728	VV
4	0.842			0.842	8891	1523	VV
5	0.967			1.230	12987	1601	VV
6	1.207			0.606	6402	455	VV
7	1.755			0.141	1487	118	VV
8	2.100			0.136	1437	127	VV
9	2.254			0.117	1235	121	VV
10	2.454			0.093	986	117	VB
11	2.895			0.058	609	83	BV
12	3.125			0.369	3897	437	VB
13	3.793			0.063	662	92	BV
14	4.740			0.682	7208	471	VB
15	5.670			0.247	2610	160	BV
16	6.067			0.064	674	54	VV
17	6.769			0.137	1452	76	VV
18	7.458			3.071	32429	1157	VV
19	8.275			3.685	38915	1176	VB
20	9.000			0.276	2911	133	BV
21	10.483			2.317	24470	538	VV
22	11.583			8.607	90907	[illegible]242	VV
23	12.914			6.485	68496	1405	VV
24	14.692			9.040	95475	1444	VB
25	16.600			8.181	86408	1321	BV

00048

27	20.258	[illegible]	[illegible]	[illegible]	VE

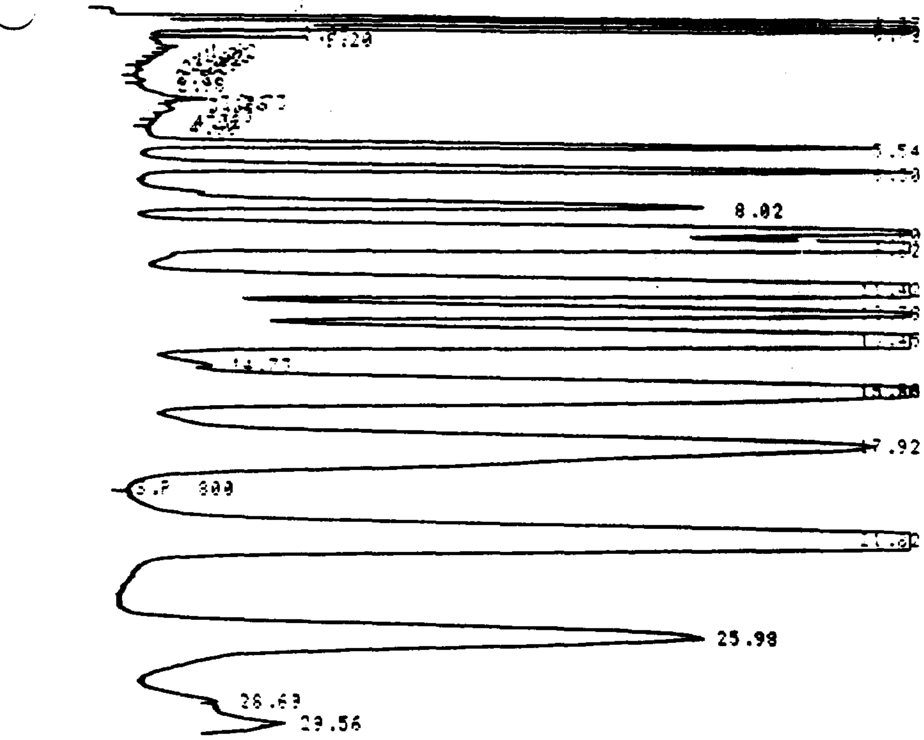
655370

28	22.942	1.419	14987	254	EV
29	24.833	7.896	~~83335~~	1002	VV
30	26.180	8.019	84692	727	VV
31	29.833	11.937	126069	1210	VE
32	32.400	0.124	1305	33	EE
33	34.767	0.314	3314	52	EE
TOTALS		100.000	1056140		

100797

3 µl Direct 12 N2455-012

CH. 1 C.S 5.00 ATT 0 OFFS 0 09/27/89 01:40



TEMP: ISO 200 C
3% OV-1
6FT:4MM ID ECD
TRACOR 560A -1
METH'S 608 /509B /8080 /8150

D-2000 09/27/89 01:40

SAMPLE: TAG: 95 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.37	8726	1678	0.37	BU	
2	0.45	760	424	0.45	TBB	
3	0.55	14265	2000	0.55	UU	
4	0.74	5984	1650	0.74	UU	
5	0.82	8699	1817	0.82	UU	
6	0.95	646	176	0.95	UB	
7	1.20	612	203	1.20	BB	
13	2.57	377	21	2.57	BB	
14	2.98	323	25	2.98	BB	
15	3.73	558	69	3.73	BU	
16	3.78	660	46	3.78	UU	
18	4.13	380	25	4.13	TBB	
21	5.54	12113	933	5.54	BB	
22	6.50	16930	997	6.50	BB	
23	8.02	15912	714	8.02	BB	
24	9.00	27450	1033	9.00	BU	
25	9.62	43253	1404	9.62	UB	
26	11.42	60422	1475	11.42	BU	
27	12.38	32737	1020	12.38	UU	
28	13.45	62907	1388	13.45	UB	
29	14.73	451	29	14.73	TBB	
30	15.58	29841	1078	15.58	UU	
31	15.65	3768	1058	15.65	UU	
32	15.70	31958	1034	15.70	UB	
33	17.92	67304	919	17.92	BB	
34	21.82	81708	1293	21.82	BB	
35	25.98	46594	729	25.98	BB	
36	28.69	448	22	28.69	BB	
37	29.56	2705	92	29.56	BB	
TOTAL		579091	23352			

PEAK REJ : 299

RAW DATA STORAGE NO. 48

100798

Time:11:33:24 Date TUE 2? SEP 89

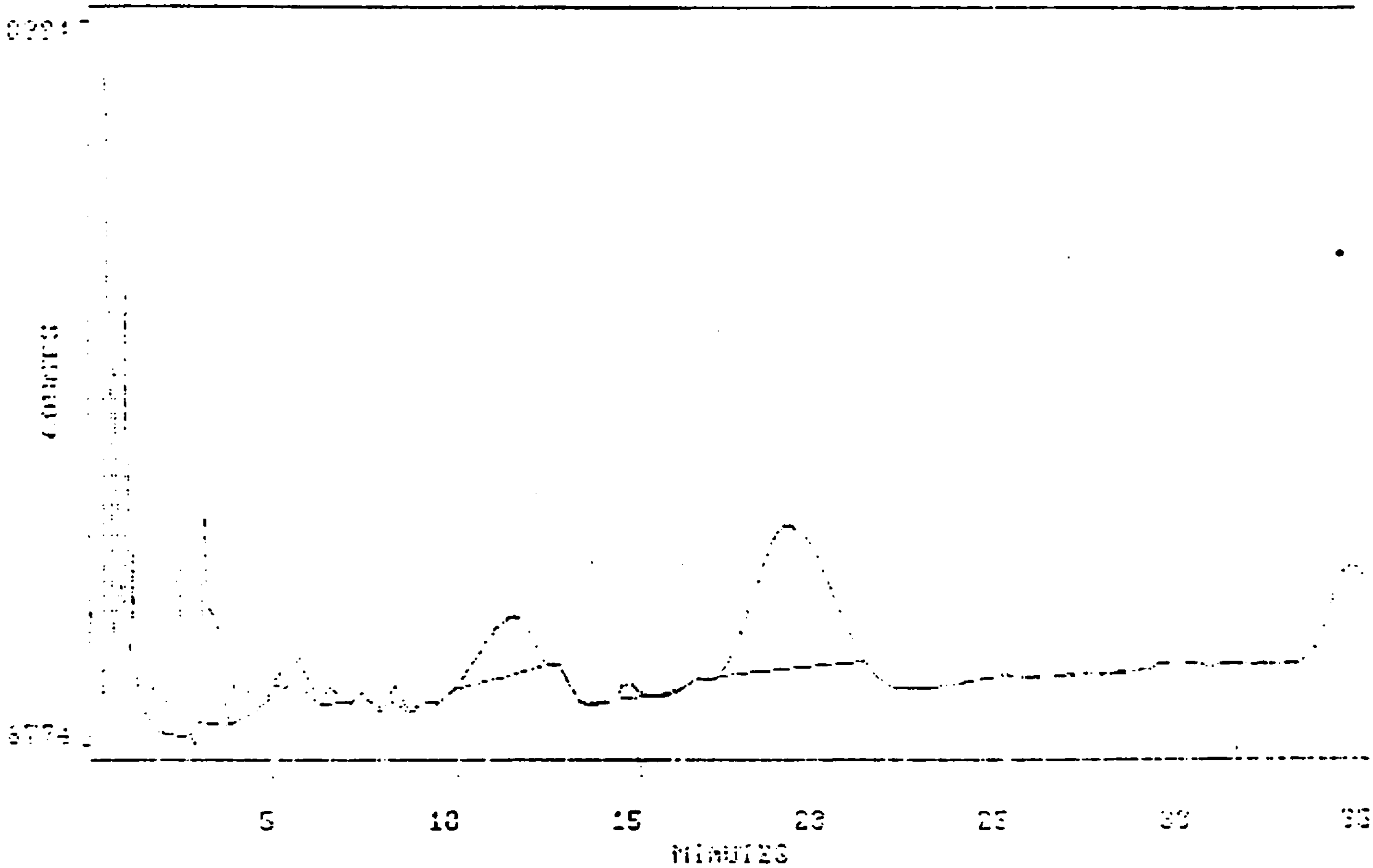
RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:00:59:06 Date TUE 2? SEP 89
Method:A4

Direct Env.

13

FILE: [illegible] SCALE: 1 RANGE (MIN.): [illegible]



100799

Channel # .... 4 Time 01:34 53 Date TUE 26 SEP 89
Run #10 of 17

Sample name ....DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file D1.N2455043
Method name.........A4

Author........METHOD 608 /// 80803 JCR
Instrument.....TRACOR 550 w. ECD
Column.......1.5%SP2250/1.95%SP2401
Notes.........
2UL 10/100ML

Run time.......35.00 min. Delay time . 0.00 min.
Acq. time.....00.59.06 Acq. date ...TUE 26 SEP 89
Start PW.......10.00 sec. End PW......30.00 sec.
Slope sens.....2.00 uv/sec

Area reject....500
peaks found..20

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.457			12.142	12814	1501	BV
2	0.675			3.727	3933	623	VB
3	1.001			3.999	4220	835	BV
4	1.200			1.322	1395	272	VB
5	1.755			0.713	753	130	BB
6	2.103			0.702	741	79	BV
7	2.463			4.996	5272	418	VB
8	3.131			9.489	10014	487	BB
9	3.931			1.126	1188	80	BV
10	4.469			1.579	1666	109	VV
11	4.717			1.263	1333	118	VB
12	5.696			1.390	1467	65	BB
13	6.531			0.718	758	41	BB
14	8.313			0.757	799	41	BB
15	11.569			11.276	11900	130	BB
16	14.718			1.097	1158	39	BB
17	19.167			39.886	42092	321	BB
18	34.600			3.818	4029	72	BB
TOTALS				100.000	105531		

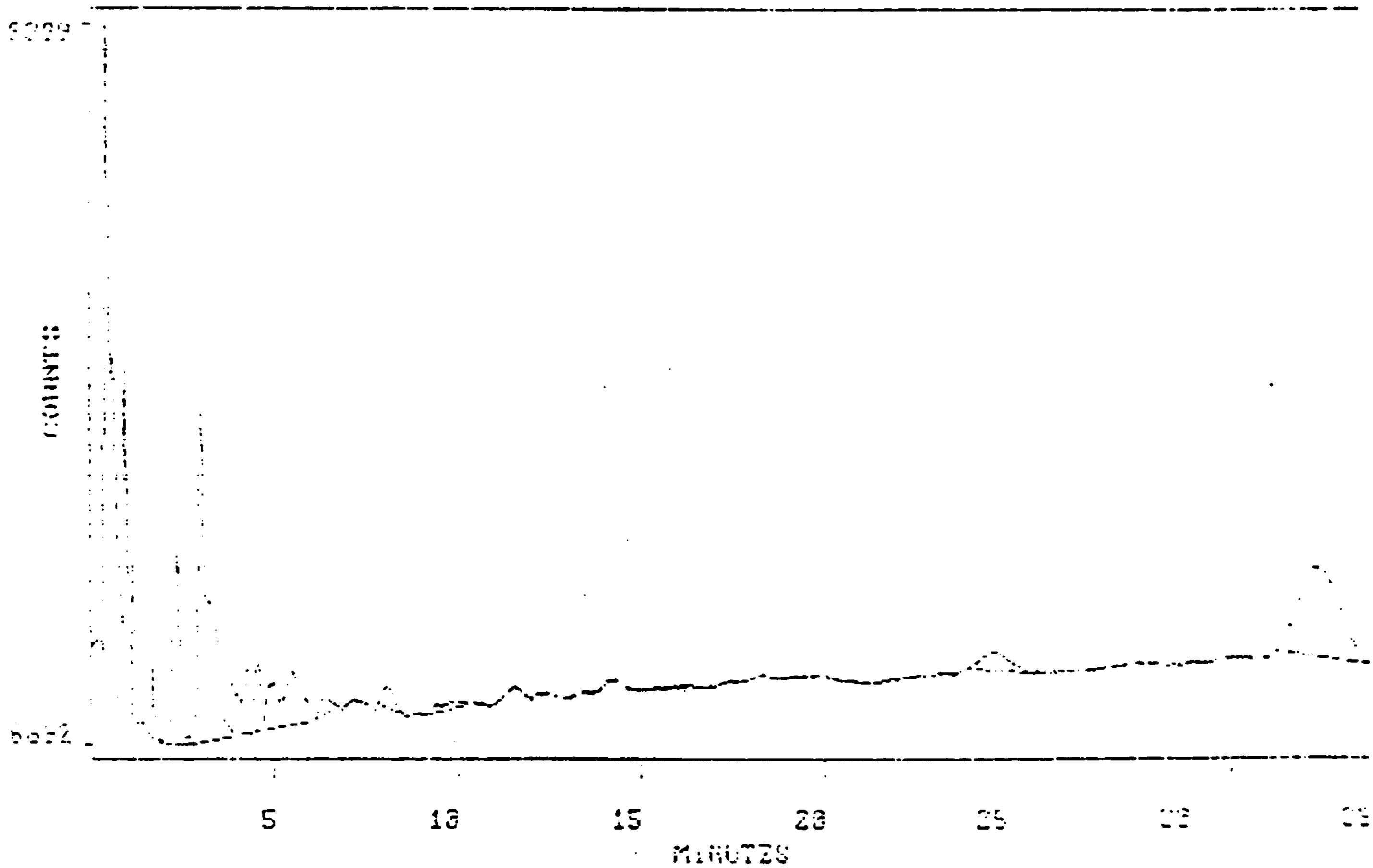
Time:11:49:10   Date:TUE 26 SEP 89

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:10:16:21   Date:TUE 26 SEP 89
Method:A4

Direct Env. 14

FILE: [illegible]   SCALE: 1   RANGE MIN. [illegible]



100801

Channel #......4   Time.10.52.12   Date TUE 26 SEP 89
Run #11 of 17

Sample name..........DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file............DI N2455014
Method name..........A4

Author.........METHOD 608 /// 80803 JCR
Instrument.....TRACOR 550 w. ECD
Column.........1.5%SP2250/1.95%SP2401
Notes..........
2UL 10/100ML

Run time.......35.00 min.   Delay time...0.00 min.
Acq. time......10:16:21   Acq. date....TUE 26 SEP 89
Start PW.......10.00 sec.   End PW.......30.00 sec.
Slope sens.....2.00 uv/sec

Area reject....500
peaks found..18

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.440			24.823	21350	1585	BV
2	0.956			6.275	5397	817	VV
3	1.165			3.133	2695	379	VB
4	1.691			1.016	874	167	BB
5	2.375			6.512	5601	454	VB
6	3.020			18.157	15617	791	BB
7	3.797			2.680	2305	114	BV
8	4.302			3.022	2599	166	VV
9	4.549			2.444	2102	162	VV
10	5.000			3.147	2707	105	VV
11	5.487			3.853	3314	126	VB
12	6.375			0.999	859	43	BB
13	8.068			1.212	1042	51	BB
14	9.958			0.849	730	17	BB
15	24.702			2.744	2360	47	BB
16	33.639			19.134	16457	216	BB
TOTALS				100.000	86009		

100802

RECONSTRUCT SCREEN DUMP
Data Acquisition

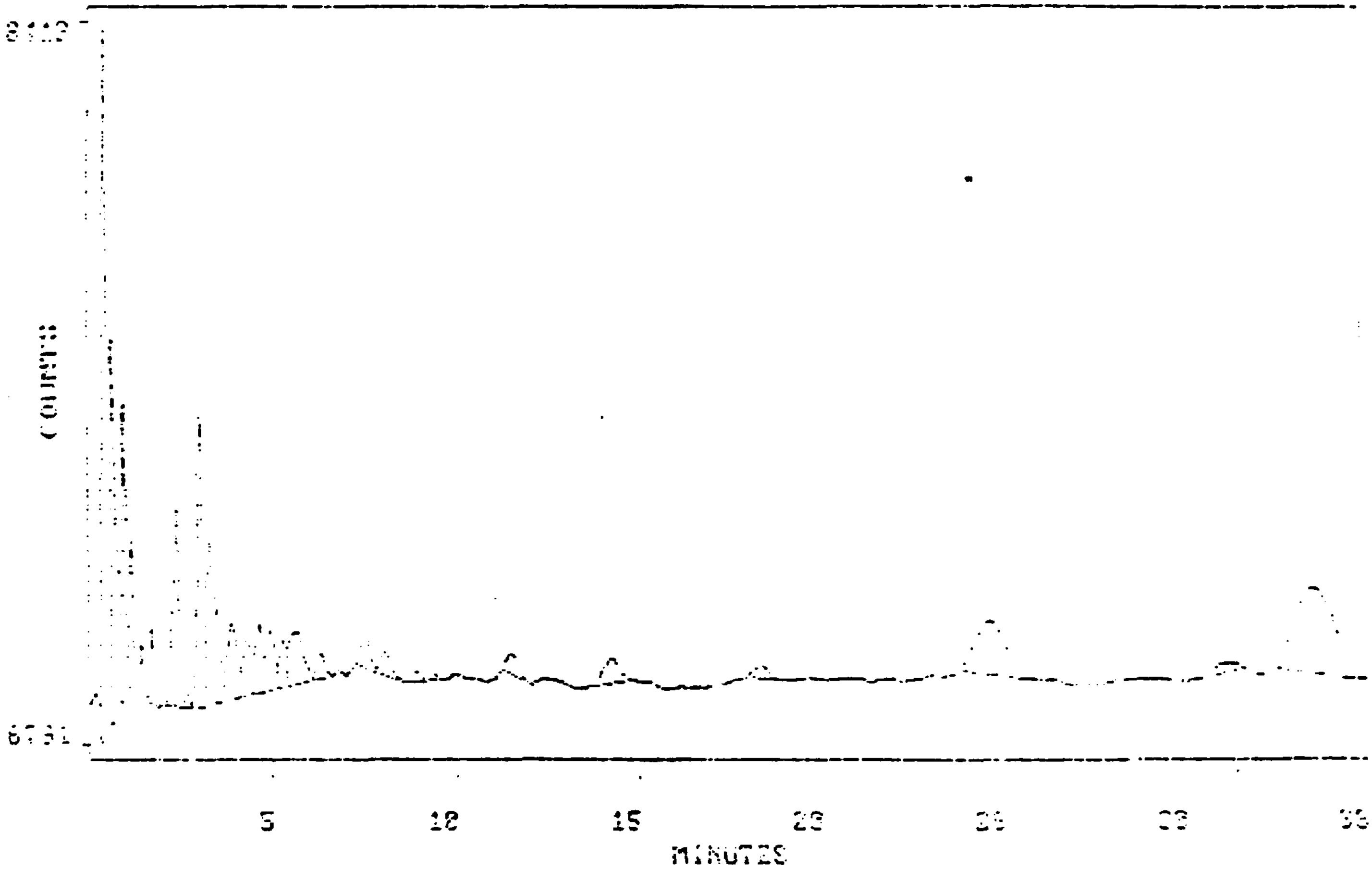
Direct Env. 15

Time:11:51:24 Date.TUE 26 SEP 89

Time:10:57:22 Date.TUE 1[illegible] SEP 89

Method:A4

FILE: [illegible] SCALE: 1 RANGE (MIN.): [illegible]



100803

Channel # 4   Time 11:35:06   Date:TUE 26 SEP 89
Run #12 of 17

Sample name........ .DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file D1:N2455015
Method name.......... A4

Author........ .METHOD 608 /// 80803 JCR
Instrument .. TRACOR 550 w. ECD
Column........ 1.5%SP2250/1.95%SP2401
Notes..........
2UL 1G/100ML

Run time........35.00 min.   Delay time...0.00 min.
Acq. time......10:57:22   Acq. date....TUE 26 SEP 89
Start PW.......10.00 sec.   End PW........30.00 sec.
Slope sens.....2.00 uv/sec.

Area reject....500
peaks found..28

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.197			0.771	725	45	BB
2	0.440			15.637	14703	1622	BV
3	0.632			9.050	8510	884	VV
4	0.956			4.831	4543	720	VV
5	1.160			2.597	2442	366	VB
6	1.706			1.198	1126	182	BB
7	2.398			5.671	5332	446	VB
8	3.025			7.474	7028	664	BV
9	3.282			7.074	6652	367	VV
10	3.914			3.377	3175	174	VV
11	4.300			2.272	2136	129	VV
12	4.644			2.212	2080	153	VV
13	4.953			2.397	2254	135	VV
14	5.297			1.379	1297	104	VV
15	5.653			3.464	3257	113	VV
16	6.352			1.029	968	59	VB
17	7.519			1.310	1232	73	BV
18	8.033			1.203	1131	53	VB
19	11.500			1.059	996	45	BB
20	14.317			2.034	1913	57	BB
21	18.328			0.920	865	29	BB
22	24.583			7.142	6716	19	BB
23	31.200			1.057	994	22	BB
24	33.561			14.840	13954	188	BB

00056

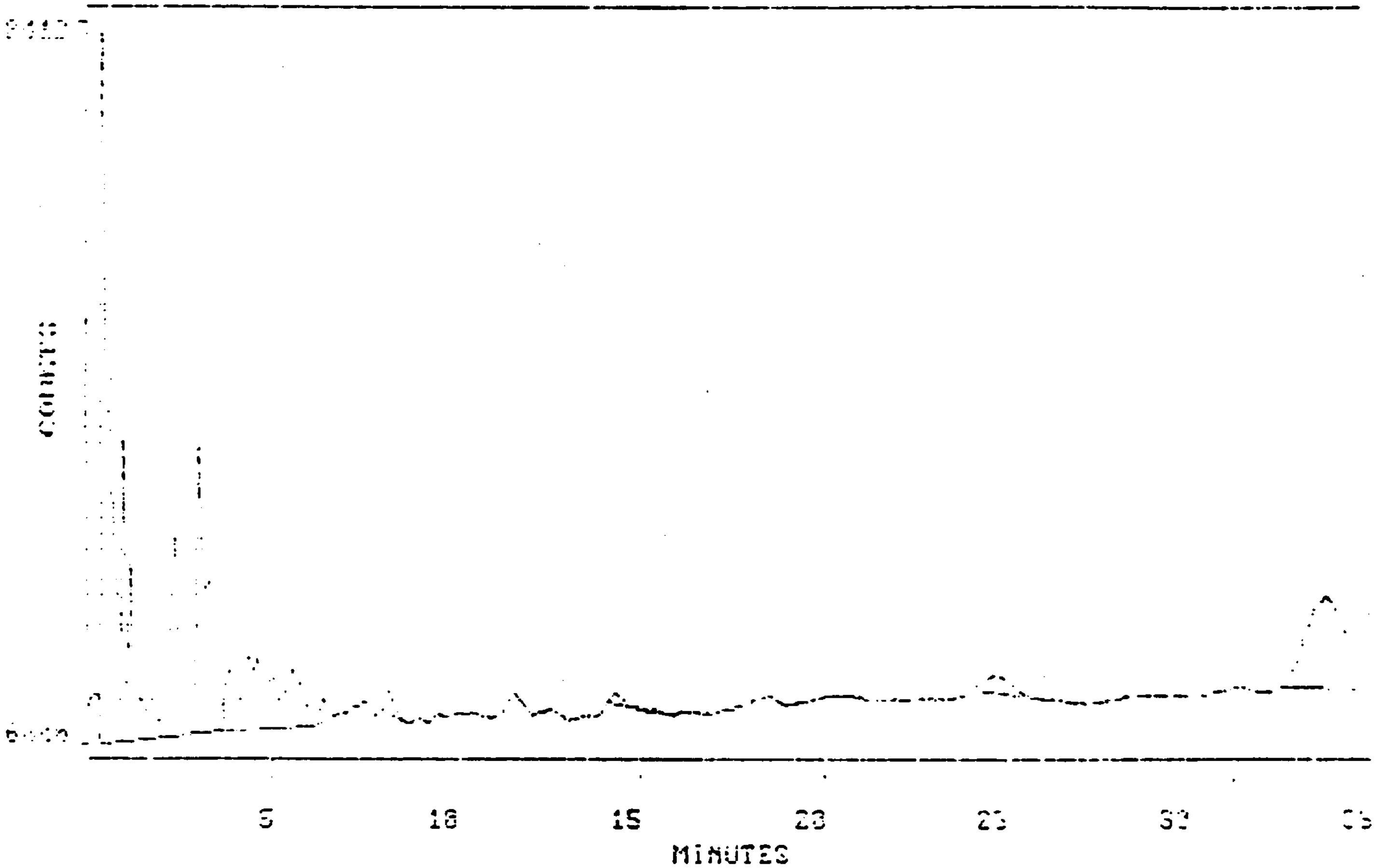
RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:12.26.12 Date TUE 26 SEP 89

Time.11.38.23 Date.TUE 26 SEP 89
Method.A4

Direct Env. 16

FILE: [illegible] SCALE: 1 RANGE (MIN.): [illegible]



Channel # 4   Time 12:14:02   Date TUE 26 SEP 89
Run #13 of 17

Sample name .... DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file D1:M2455016
Method name A4

Author .... METHOD 608 /// 80803 JCR
Instrument ..... TRACOR 550 w. ECD
Column 1.5%SP2250/1.95%SP2401
Notes ....
2UL 1G/100ML

Run time ....35.00 min.   Delay time ...0.00 min.
Acq. time ......11 38:23   Acq. date ....TUE 26 SEP 89
Start PW ....10.00 sec.   End PW ....30.00 sec.
Slope sens .....2.00 uv/sec

Area reject 500
peaks found ..20

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	EL
1	0.235			1.140	982	71	EE
2	0.447			24.967	21511	1573	BV
3	0.977			5.961	5136	709	VV
4	1.180			5.382	4637	402	VV
5	1.714			2.111	1819	222	VV
6	2.048			0.674	581	60	VV
7	2.404			6.843	5896	441	VE
8	3.048			8.742	7532	627	EV
9	3.292			7.310	6298	331	VV
10	3.867			3.083	2656	131	VV
11	4.347			3.304	2847	153	VV
12	4.587			2.138	1842	135	VV
13	5.015			2.677	2306	112	VV
14	5.547			4.718	4065	125	VE
15	6.397			0.860	741	44	EE
16	8.142			0.984	848	45	EE
17	24.750			2.247	1936	38	EE
18	33.858			16.858	14524	193	EE
TOTALS				100.000	86157		

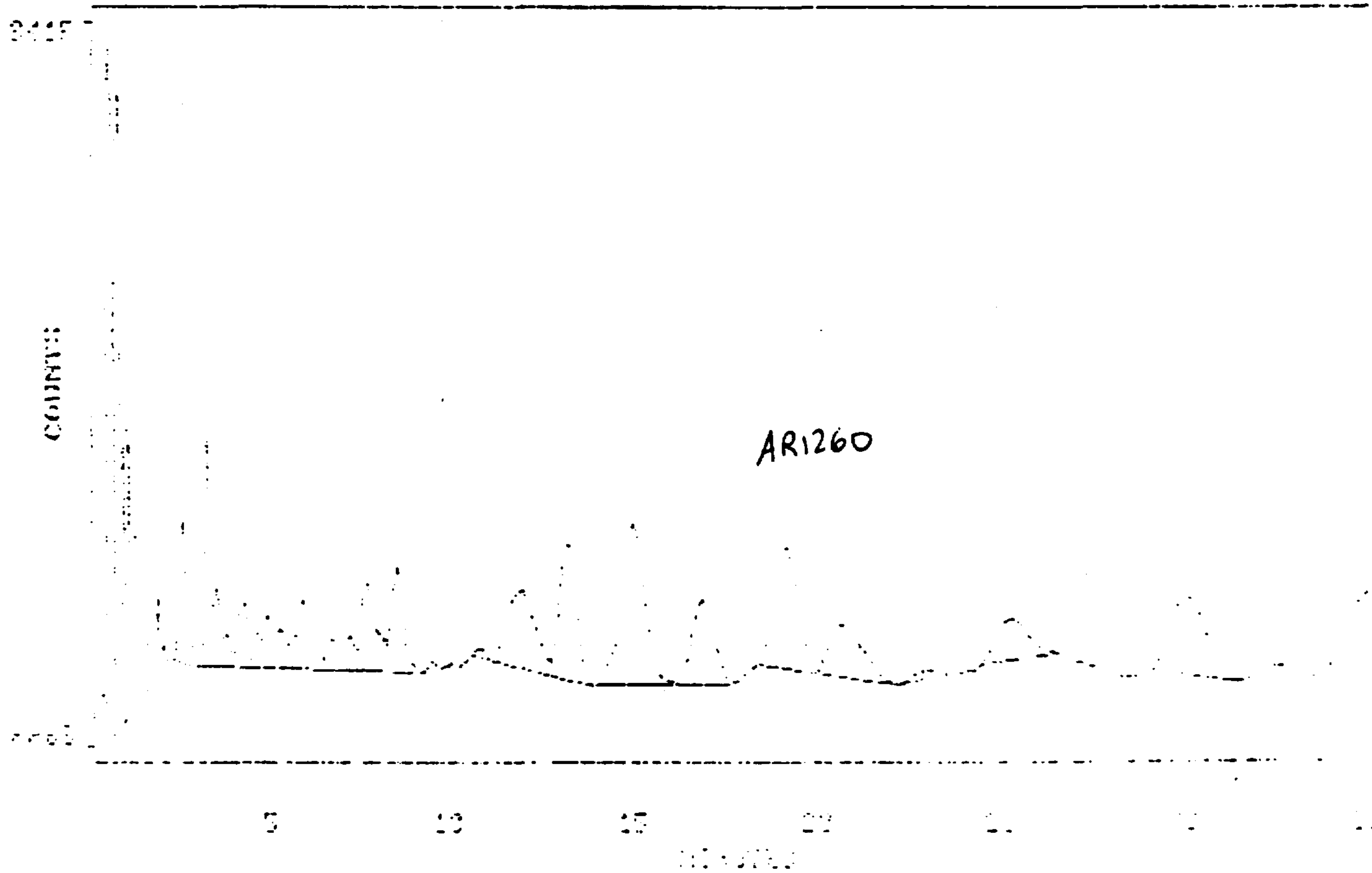
Time 12:56:19   Date TUE 26 SEP 89

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time 12:19:24   Date TUE 26 SEP 89
Method A4

Direct Env.   17

FILE: MD155D17   SCALE: 1   RANGE (MIN.): 0.02 TO 35.00



Channel # . . . . . 4 Time 12 55 19 Date TUE 26 SEP 89
Run #14 of 17

Sample name . . . . DIRECT ENVIRONMENTAL 9/13-19,20/89
Data file D1 N2455017
Method name A4

Author . . . . METHOD 608 /// 80803 JCR
Instrument . . . . TRACOR 550 w. ECD
Column 1.5%SP2250/1.95%SP2401
Notes . . . .
2UL 10/100ML

Run time . . . . . 35.00 min. Delay time . . 0.00 min
Acq. time . . . . 12 19 24 Acq. date . . TUE 26 SEP 89
Start PW . . . . . . 10.00 sec. End PW . . . . . . 30.00 sec
Slope sens . . . . . 2.00 uv/sec

Area reject 500
peaks found . . 34

AREA PERCENT REPORT

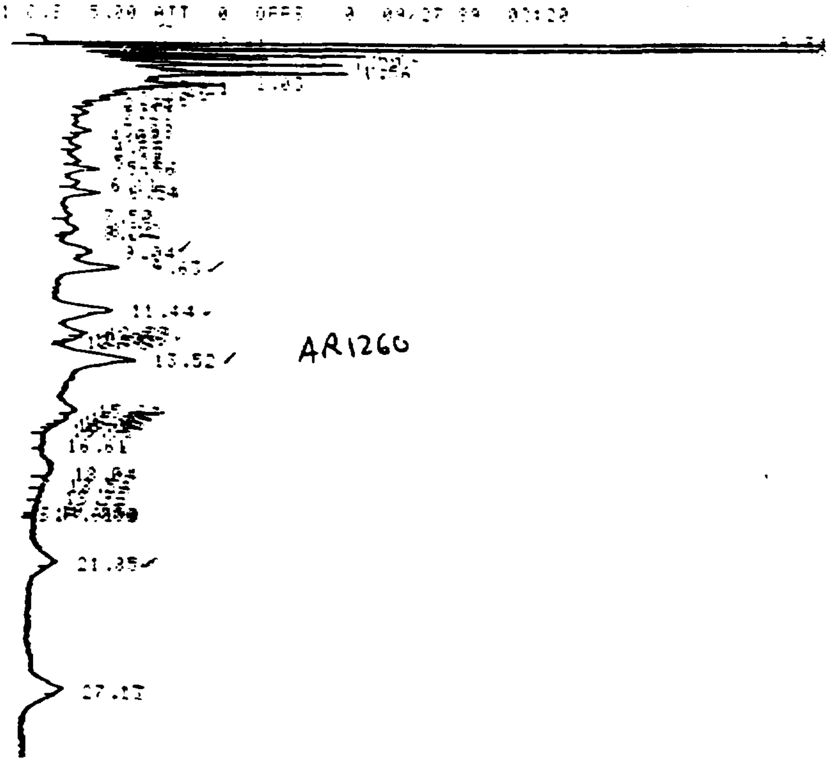
Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.286			0.731	1154	92	BB
2	0.459			8.728	13772	1552	BV
3	0.666			8.298	13093	1422	VV
4	0.848			2.013	3176	609	VV
5	0.982			2.995	4725	617	VV
6	1.215			2.880	4544	425	VV
7	1.584			0.562	887	98	VV
8	1.788			0.799	1260	188	VV
9	2.513			1.773	2798	321	VB
10	3.138			3.205	5057	483	BV
11	3.403			1.820	2871	169	VV
12	4.136			1.593	2514	137	VV
13	4.431			0.747	1179	76	VV
14	4.806			1.031	1627	116	VV
15	5.117			0.985	1555	83	VV
16	5.736			2.922	4610	148	VV
17	6.517			0.927	1463	66	VV
18	6.972			0.875	1380	75	VV
19	7.481			3.287	5187	187	VV
20	8.300			3.246	5122	222	VB
21	11.631			5.816	9177	168	VV
22	12.931			6.140	9688	291	VB
23	14.708			9.593	15137	341	BV
24	16.595			4.943	7799	183	VB
25	18.850			7.226	11402	255	BV

00060

06170

27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	24.983	3.355	~~[illegible]~~	91	EE
29	19.858	7.201	11341	170	EE
30	34.710	1.447	2283	41	EE
TOTALE		100.000	157769		

Soil Direct 17 - D455-017



TEMP: ISO 200 C
3% OV-1
6FT:4MM ID ECD
TRACOR 550A -I
METH'S 608 /5050 /8090 /8150

D-2000 09/27/89 02:20

SAMPLE: TAG: 95 CH: 1

FILE: 1 CALC-~~METHOD~~: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	PPT	BC	NAME
1	0.34	3295	1220	0.34	BB	
2	0.41	879	246	0.41	BU	
3	0.56	7877	1728	0.56	UU	
4	0.74	819	267	0.74	UU	
5	0.92	1615	433	0.92	UU	
6	0.96	1510	386	0.96	UU	
7	1.20	4785	394	1.20	UU	
9	1.56	5369	394	1.56	UU	
10	2.03	2543	227	2.03	UU	
11	2.21	1312	173	2.21	UU	
12	2.43	1136	95	2.43	UU	
13	2.68	723	68	2.68	UU	
14	2.91	365	41	2.91	UU	
15	3.23	428	26	3.23	UB	
20	5.56	413	37	5.56	BB	
21	6.11	318	20	6.11	TBB	
22	6.54	760	50	6.54	BB	
24	8.12	756	30	8.12	BB	
26	9.04	1017	39	9.04	BU	
27	9.63	1650	76	9.63	UB	
28	11.44	1690	67	11.44	BB	
29	12.39	813	40	12.39	BU	
33	13.52	2514	85	13.52	BB	
34	15.64	475	29	15.64	BB	
35	15.79	409	25	15.79	BU	
39	16.61	492	19	16.61	BB	
40	18.04	848	24	18.04	BB	
41	18.54	493	23	18.54	BB	
42	18.96	423	19	18.96	BB	
43	19.38	402	17	19.38	BB	
45	21.85	1039	29	21.85	BB	
46	27.13	1686	40	27.13	BB	
TOTAL		48953	6246			

PEAK REJ : 200

RAW DATA STORAGE NO. 29

100810

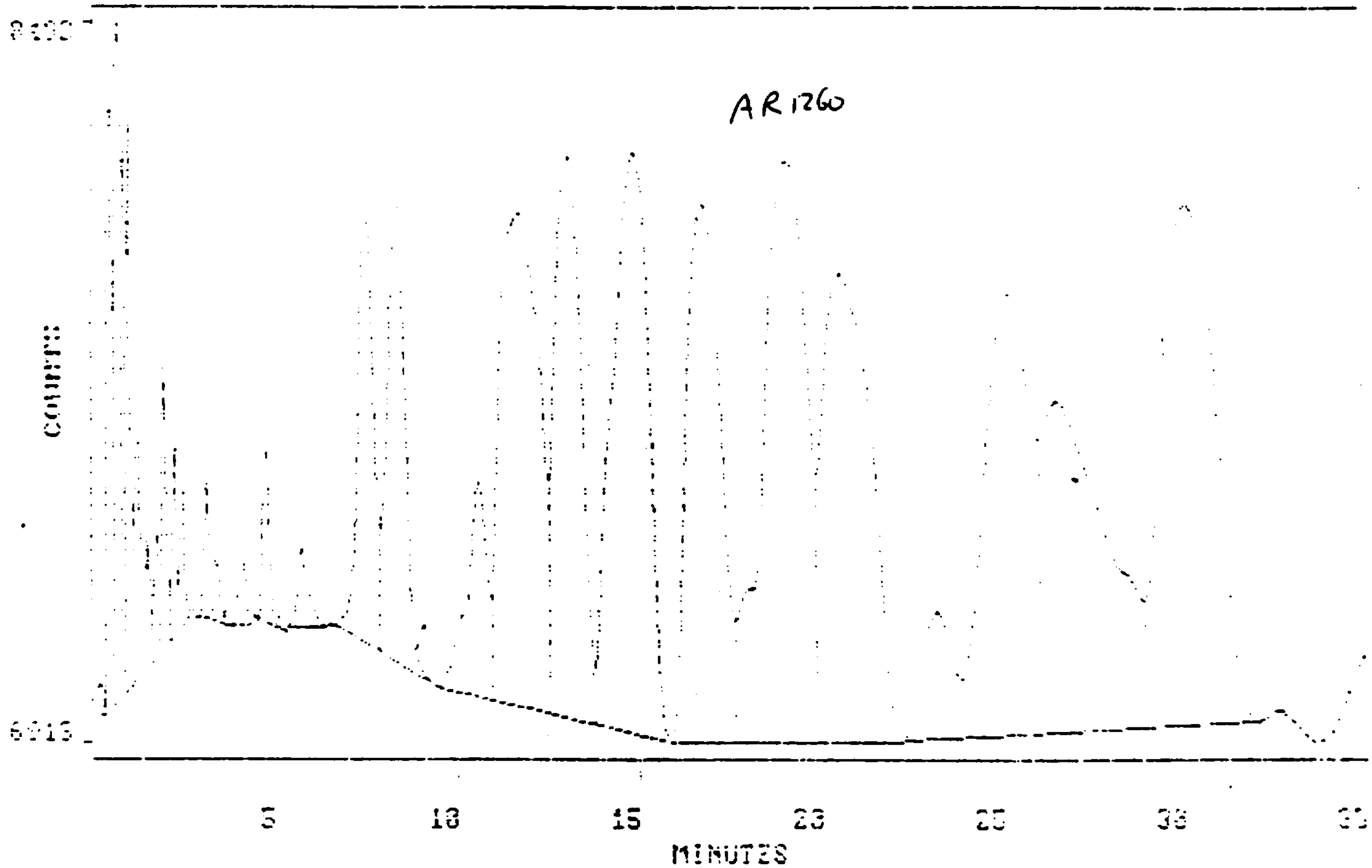
Time:14:18:34 Date:TUE 2[illegible] SEP 89

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:12:56:56 Date:TUE 26 SEP 89
Method:A4

Direct Env 18

FILE: [illegible] SCALE: 1 RANGE (MIN.): [illegible]



100811

Channel # 4 Time 13 31.33 Date TUE 12 SEP 89
Run #15 of 17

Sample name DIRECT ENVIRONMENTAL 9/10-19,22/89
Data file D1.M2455018
Method name A4

Author METHOD 608 -/ 80803 JCR
Instrument TRACOR 550 w/ ECD
Column 1.5%SP2250/1.95%SP2401
Notes
2UL 10/100ML

Run time 35.00 min. Delay time 0.00 min.
Acq. time 12.56.56 Acq. date TUE 12 SEP 89
Start PW 10.00 sec. End PW 30.00 sec.
Slope sens. 2.00 uv/sec.

Area reject 500
peaks found 32

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.247			0.079	784	53	BB
2	0.464			1.293	12827	1437	BV
3	0.673			1.762	17473	1495	VV
4	0.856			0.703	6973	1239	VV
5	0.980			1.033	10243	1274	VV
6	1.273			0.747	7411	547	VV
7	1.538			0.257	2553	279	VV
8	1.800			0.236	2336	269	VV
9	1.974			0.553	5482	621	VV
10	2.286			0.367	3633	418	VV
11	2.518			0.257	2548	328	VB
12	3.145			0.301	2989	297	BV
13	3.405			0.169	1676	140	VV
14	4.133			0.196	1947	142	BB
15	4.773			0.522	5181	386	BB
16	5.750			0.390	3869	176	BB
17	7.522			2.773	27503	945	BV
18	8.364			3.479	34504	1006	VB
19	9.078			0.199	1972	104	BB
20	10.622			1.848	18331	473	BV
21	11.725			8.258	81913	1084	VV
22	13.092			6.302	62505	1230	VV
23	14.914			8.931	88585	[illegible]277	VB
24	16.803			7.725	76628	[illegible]183	BV
25	19.108			10.671	105843	1278	VV

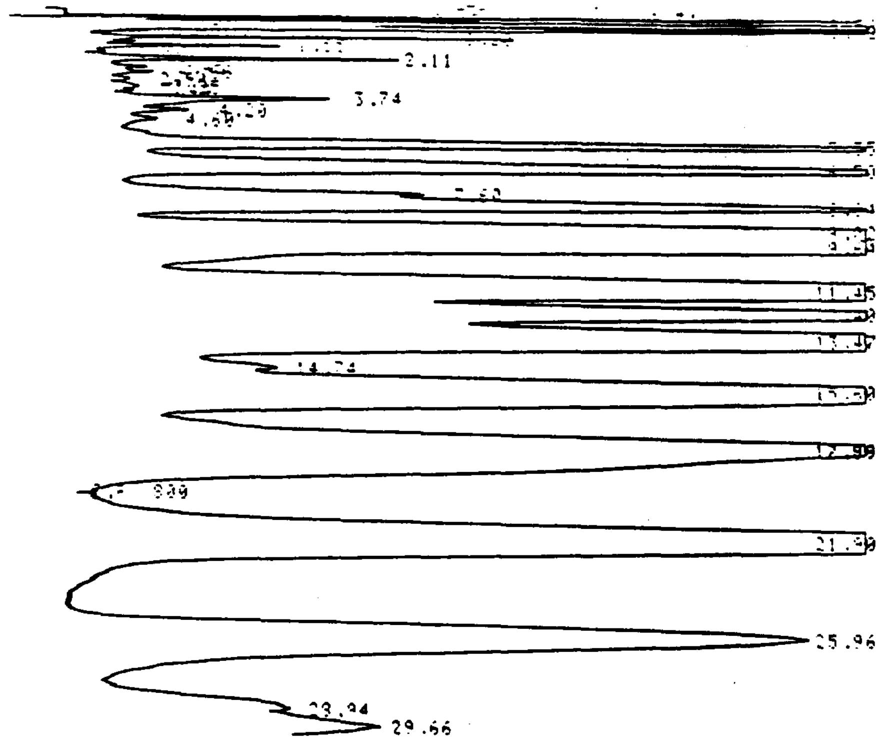
629051

00064

28	25.200	8.531	84[illegible]21	[illegible]	VV
29	2[illegible].544	9.089	[illegible]	730	VV
30	30 189	12.176	120770	1144	VE
TOTALS		100.000	991871		

3,4 Direct IS N2455-018

CH. 1 C.S 5.00 ATT 0 OFFS 0 09/27/89 03:00



AR1260

TEMP: ISO 200 C
ON OV-1
6FT:4MM ID ECD
TRACOR 550A -1
METH'S 608 /5098 /9080 /815A

D-2000 09/27/89 03:00

SAMPLE: TAG: 97 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: A CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.34	2793	1050	0.34	BB	
2	0.45	2312	582	0.45	BU	
3	0.56	15661	2073	0.56	UU	
4	0.74	5770	1576	0.74	UU	
5	0.82	8093	1724	0.82	UU	
7	1.20	3197	603	1.20	UU	
8	1.38	895	121	1.38	UU	
9	1.55	2184	296	1.55	UU	
10	1.80	506	69	1.80	UU	
11	2.11	3616	425	2.11	UU	
12	2.45	1043	95	2.45	UU	
13	2.66	1224	93	2.66	UU	
14	2.96	657	53	2.96	UU	
15	3.25	962	55	3.25	UU	
17	3.74	3840	278	3.74	UU	
18	4.20	765	82	4.20	UB	
19	4.60	361	35	4.60	BB	
20	5.55	18958	1134	5.55	BU	
21	6.50	28057	1200	6.50	UB	
22	7.60	5403	379	7.60	BU	
23	8.04	27779	972	8.04	UU	
24	9.02	36238	1183	9.02	UU	
25	9.64	54424	1480	9.64	UU	
26	11.45	74981	1545	11.45	UU	
27	12.40	46391	1193	12.40	UU	
28	13.47	84558	1500	13.47	UU	
29	14.74	741	51	14.74	TBB	
30	15.60	79552	1182	15.60	UU	
31	17.98	41928	1081	17.98	UU	
32	18.09	56375	1060	18.09	UB	
33	21.90	104311	1386	21.90	BB	
34	25.96	66247	919	25.96	BB	
35	28.94	3548	95	28.94	BU	
36	29.66	4600	117	29.66	UB	
TOTAL		788855	25687			

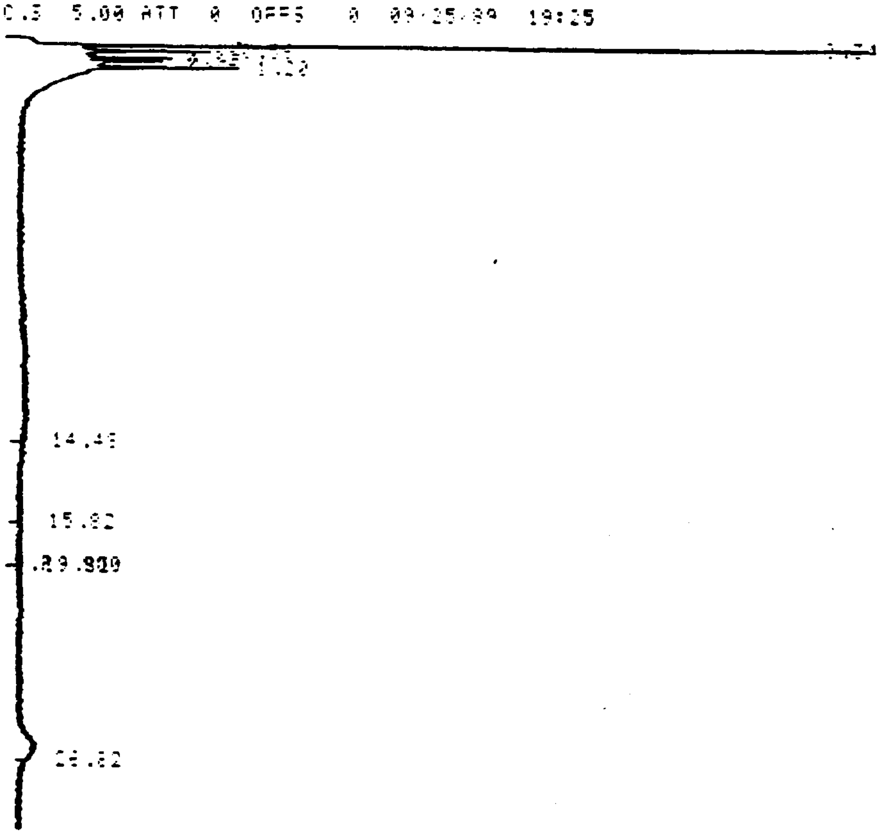
PEAK REJ : 299

RAW DATA STORAGE NO. 50

100814

2ul Direct N2455-020 1g/100ml

CH. 1 C.3 5.00 ATT 0 OFFS 0 09/25/89 19:25



TEMP: ISO 200 C
3% OV-1
6FT:4MM ID ECD
TRACOR 550A -1
METH'S 609 /5098 /2080 /8150

D-2000 09/25/89 19:25

SAMPLE: TAG: 72 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

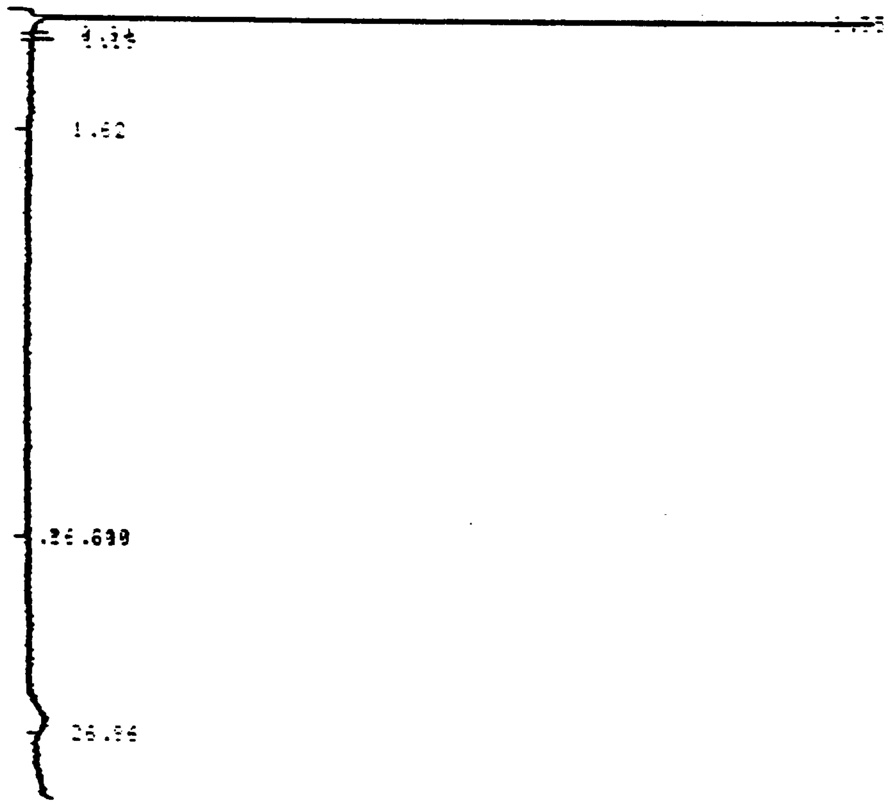
NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.34	9275	1705	0.34	BV	
2	0.56	485	151	0.56	TBV	
3	0.82	501	116	0.82	TVV	
4	0.95	718	107	0.95	TVV	
5	1.20	1626	202	1.20	TVB	
6	14.48	1228	15	14.48	BB	
7	15.82	1715	15	15.82	BB	
8	19.82	1146	15	19.82	EB	
9	26.82	874	17	26.82	EB	
TOTAL		16568	2343			

PEAK REJ : 299

RAW DATA STORAGE NO. 26

2ml Direct N2455021 1g/100ml

CH. 1 C.S 5.00 ATT 0 OFFS 0 09/25/89 20:05



TEMP: ISO 200 C
3% OV-1
6FT:4MM ID ECD
TRACOR 550A -1
METH'S 608 /509B /8080 /8150

D-2000 09/25/89 20:05

SAMPLE: TAG: 73 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.35	9734	2012	0.35	BB	
4	1.62	1351	7	1.62	BB	
5	16.61	10230	18	16.61	BU	
6	26.96	872	17	26.96	BB	
TOTAL		22187	2054			

PEAK REJ : 299

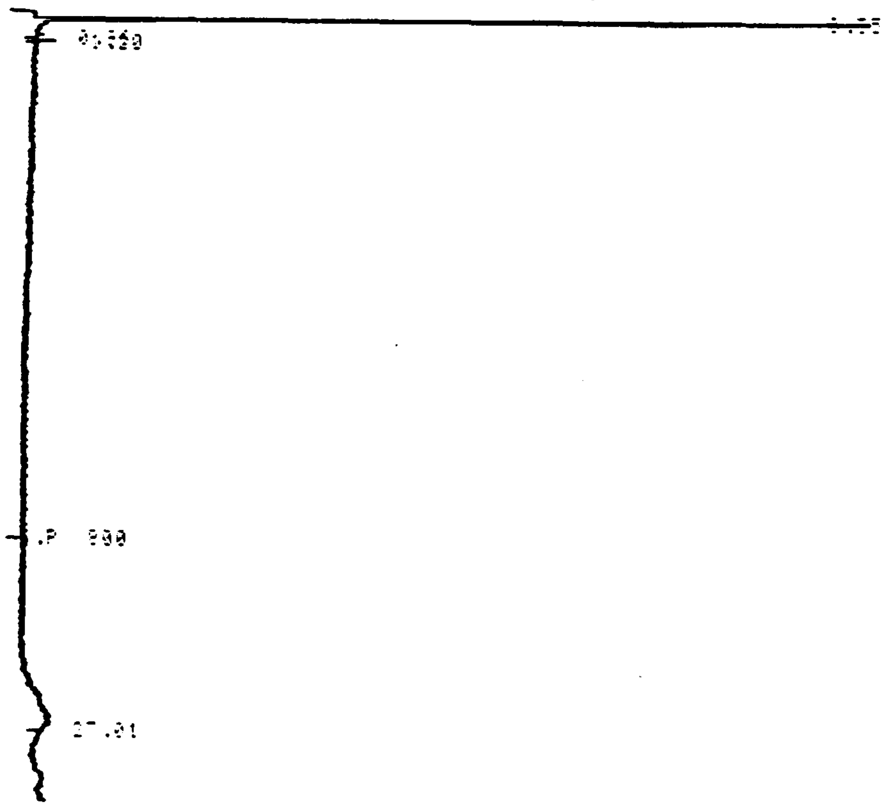
RAW DATA STORAGE NO. 27

100816

1g/100ml

2 ul Direct N2455-022

CH. 1 C.S 5.00 ATT 0 OFFS 0 09/25/89 20:45



TEMP: ISO 200 C
3% OV-1
6FT:4MM ID ECD
TRACOR 550A -1
METH'S 608 /5098 /8080 /8150

D-2000 09/25/89 20:45

SAMPLE: TAG: 74 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.35	8659	1984	0.35	BB	
4	27.01	1282	19	27.01	BB	
TOTAL		9941	2003			

PEAK REJ : 299

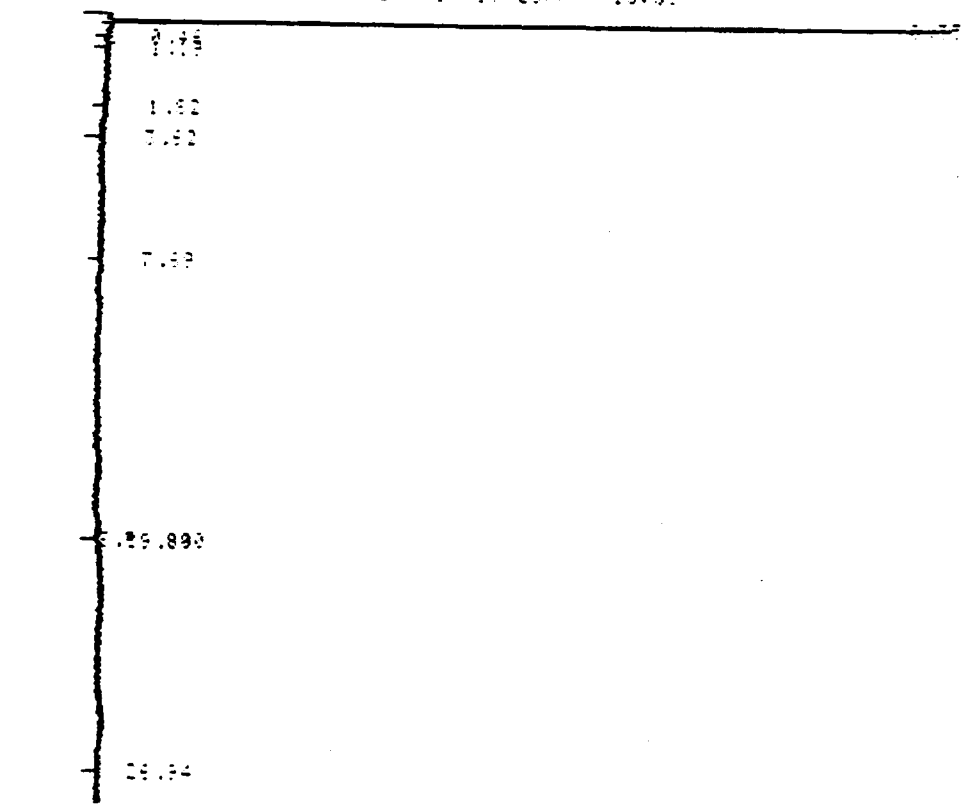
RAW DATA STORAGE NO. 28

100817

1g/100ml

2µl Direct 23 N2455-023

CH. 1 C.S 5.00 ATT 0 OFFS 0 09/26/89 13:59



TEMP: ISO 200 C
3% OV-1
6FT:4MM ID ECD
TRACOR 550A -1
METH'S 608 /5038 /8080 /8150

D-2000 09/26/89 13:59

SAMPLE: TAG: 84 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.35	4981	1683	0.35	BB	
2	0.46	356	15	0.46	PB	
4	1.82	2453	22	1.82	BB	
5	3.62	1379	24	3.62	BB	
6	7.69	5249	24	7.69	BB	
7	19.89	10573	21	19.89	BB	
8	26.94	10184	25	26.94	BB	
TOTAL		37184	2014			

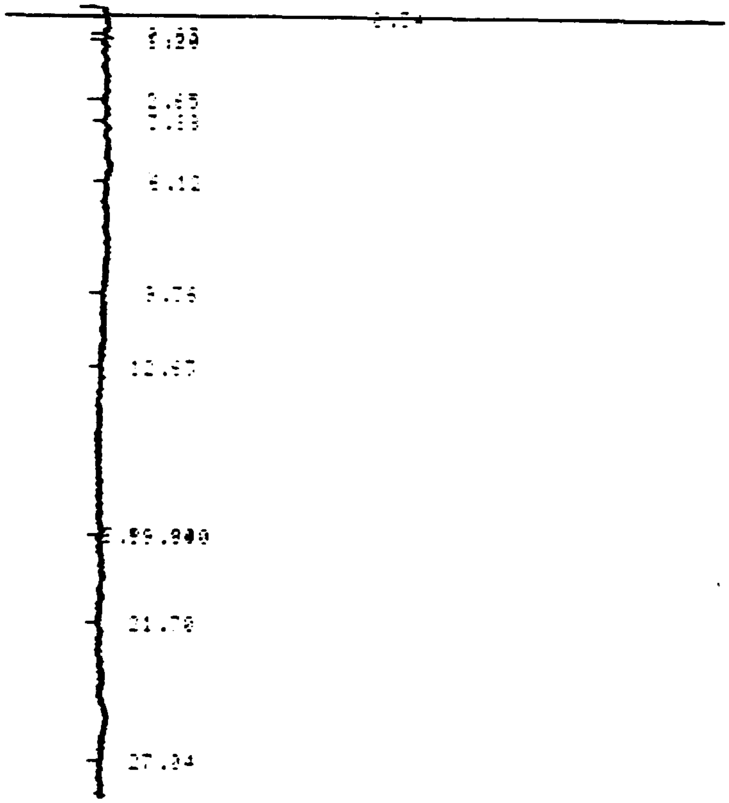
PEAK REJ : 299

RAW DATA STORAGE NO. 37

100818

2 µl Direct 24 N2455-024 1g/100ml

CH. 1 C.S 5.00 ATT 0 OFFS 0 09.26.89 14:39



TEMP: 150 200 C
3% OV-1
6FT:4MM ID FID
TRACOR 550A -1
METH'S 400 /5000 /0000 /0150

I-2000 09/26/89 14:39

SAMPLE: TAG: 85 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RET	BC	NAME
1	0.34	1675	683	0.34	BB	
2	0.83	41613	223	0.83	BV	
4	2.65	2137	21	2.65	TBB	
5	3.83	870	22	3.80	TBB	
6	6.12	2307	21	6.12	TBB	
7	9.76	1954	16	9.76	BB	
8	12.63	2145	17	12.63	BB	
10	21.70	1024	10	21.70	BB	
11	27.04	970	10	27.04	BB	
TOTAL		54615	943			

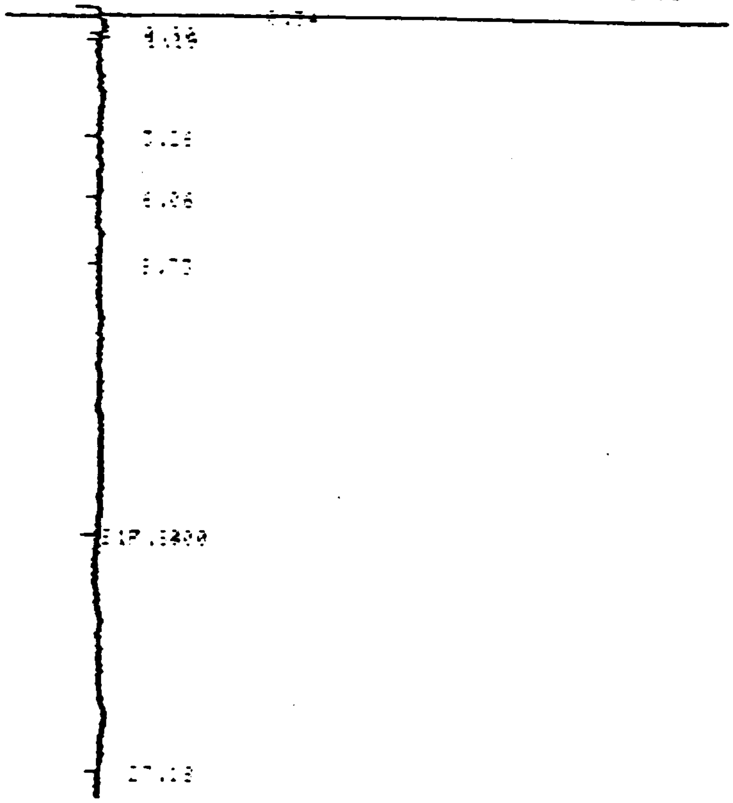
PEAK REJ : 299

RAW DATA STORAGE NO. 38

100819

2ul Direct 25 N2455 -025 1g/100ml

CH. 1 C.S 5.00 ATT 0 OFFS 0 09/26/89 15:12



TEMP: 130 200 C
TC OV-1
6FT:4MM ID FID
TRACOR 5500 -1
METH'S 600 /5090 /3030 /8150

D-2000 09/26/89 15:12

SAMPLE: TAG: 86 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

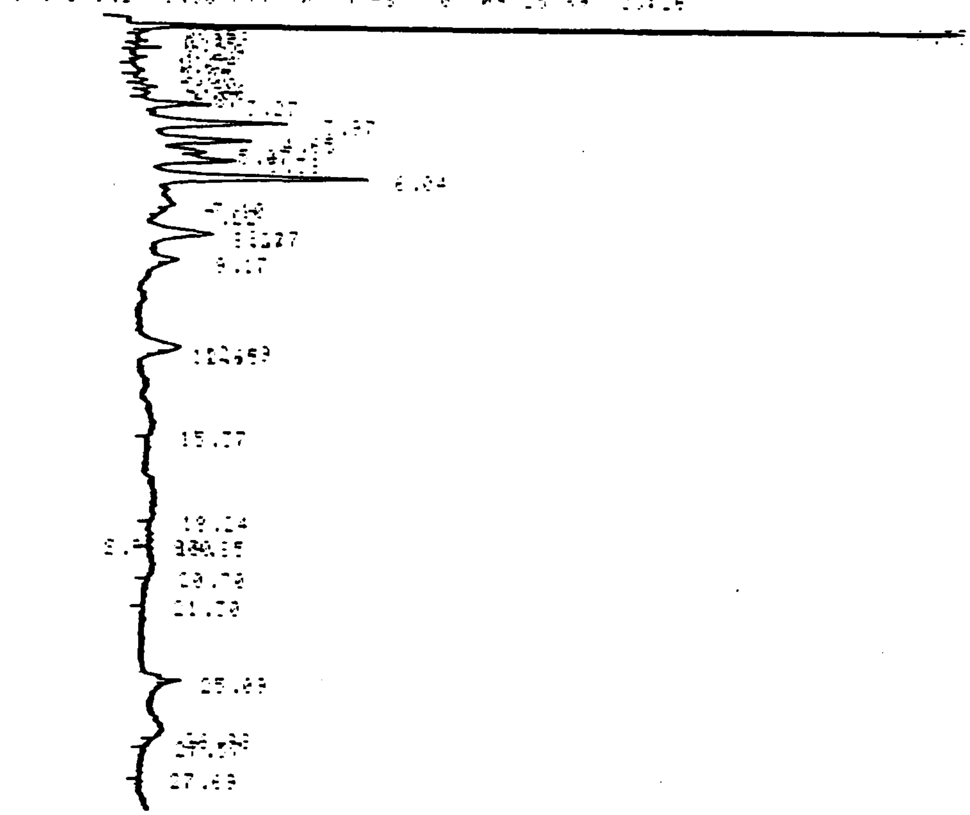
NO.	RT	AREA	HEIGHT	PPT	BC	NAME
1	0.34	1690	572	0.34	BB	
2	0.80	124793	227	0.80	BV	
4	3.26	3622	23	3.26	TBB	
5	6.06	2474	23	6.06	TBB	
6	9.73	2733	24	9.73	TBB	
7	17.84	12204	25	17.84	TBB	
8	27.18	971	9	27.18	BB	
TOTAL		148087	903			

PEAK REJ : 299

RAW DATA STORAGE NO. 39

100820

2µl Direct NC455-026



TEMP: ISO 200 C
3% OV-1
6FT:4MM ID SCD
TRACOR 550A -1
METH'S 600 /5000 /9000 3150

D-2000 09/25/89 23:26

SAMPLE: TAG: 73 CH: 1

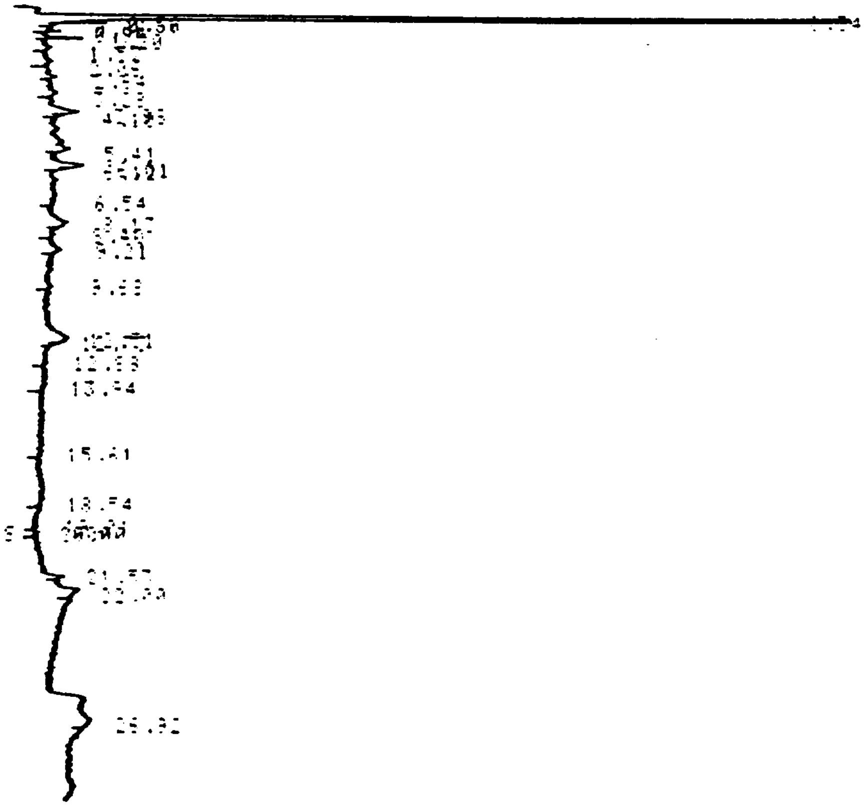
FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.35	10334	2005	0.35	BU	
8	2.07	390	25	2.07	BB	
11	2.87	317	24	2.87	BB	
12	3.27	937	83	3.27	PR	
13	3.97	1825	155	3.97	BA	
14	4.65	1764	112	4.65	BU	
15	5.07	541	51	5.07	TBU	
16	5.38	1415	90	5.38	TUB	
17	6.04	3164	244	6.04	BB	
18	7.10	349	22	7.19	BB	
20	8.17	837	65	8.17	BU	
21	8.27	317	48	8.27	UB	
22	9.17	499	32	9.17	BB	
23	12.49	371	46	12.49	BU	
25	15.37	567	15	15.37	BB	
26	18.24	1246	17	18.24	BB	
28	20.70	950	18	20.70	BB	
29	21.30	579	14	21.30	BB	
30	25.09	696	39	25.09	BB	
31	26.98	950	24	26.98	BB	
33	27.69	679	13	27.69	BB	
TOTAL		[illegible]	3142			

100821

2 ml Direct N2-155-027

CH. 1 C.S 5.00 ATT 0 OFFS 0 00/00/00 00:00



TEMP: ISO 200 C
3% OV-1
6FT:4MM ID ECD
TRACOR 550A -1
METH'S 608 /5035 /8080 /8150

D-2000 09/26/89 00:06

SAMPLE: TAG: 79 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.34	14269	2041	0.34	BV	
8	2.06	543	23	2.06	RR	
9	2.64	447	23	2.64	BB	
11	3.98	389	36	3.98	BB	
13	5.41	432	25	5.41	BB	
14	6.01	426	40	6.01	BV	
16	6.54	430	8	6.54	BB	
17	8.13	406	23	8.13	BB	
20	9.68	809	14	9.68	BB	
21	12.51	533	27	12.51	BB	
23	12.88	390	12	12.88	BB	
24	13.94	764	18	13.94	BB	
25	15.61	1928	17	15.61	BB	
26	18.54	576	14	18.54	BB	
27	19.01	543	14	19.01	BB	
30	22.00	848	23	22.00	BB	
31	26.92	3126	38	26.92	BB	

TOTAL

26860 2396

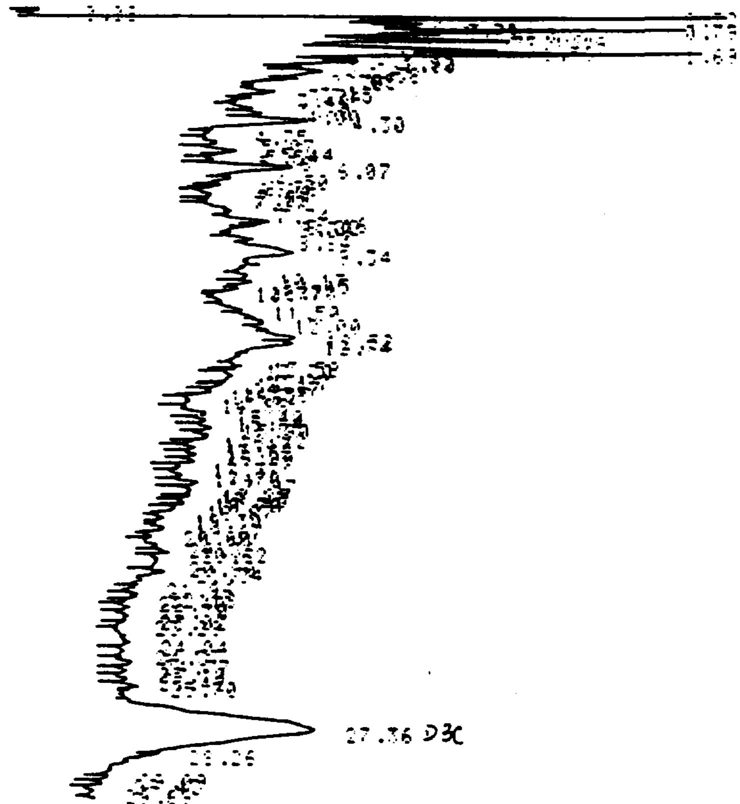
PEAK REJ : 299

RAW DATA STORAGE NO. 33

100822

2 µl Direct S-1 N2455-028 (g/10ml)

CH. 1 C.S 5.00 ATT 0 OFFS 0 09/23/89 04:31



TEMP: ISO 200 C
IN 2V-1
6FT:4MM ID ECD
TRACOR 5509 -1
METH'S 608 /508B /8080 /8150

D-2000 09/23/89 04:31

SAMPLE: TAG: 66 CH: 1

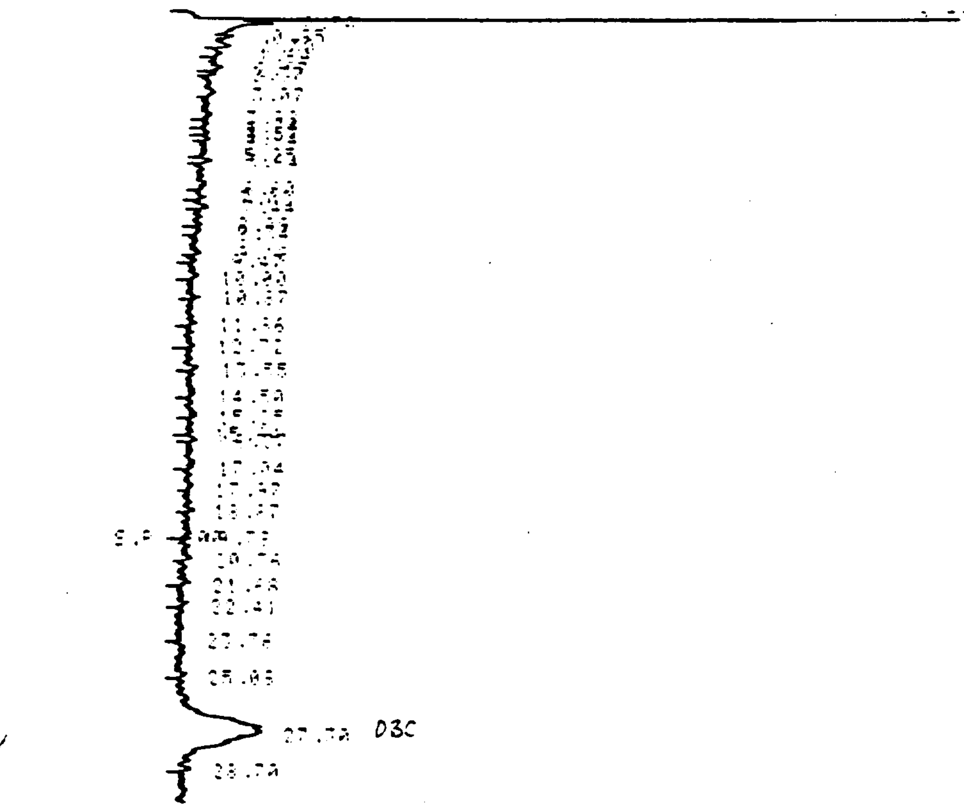
FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
2	0.32	34246	1356	0.32	BV	
6	0.79	1206	395	0.79	TVV	
9	1.19	1739	215	1.19	TBB	
11	1.56	1912	222	1.56	TBV	
12	1.69	3028	469	1.69	TVV	
14	2.38	940	70	2.38	TVV	
24	4.30	2029	116	4.30	VS	
30	6.07	2289	117	6.07	BV	
41	9.34	913	54	9.34	BB	
60	15.90	1411	53	15.90	VV	
79	20.90	963	34	20.90	VV	
80	21.34	1148	48	21.34	VB	
93	27.36	17493	233	27.36	BV	

TOTAL

2 µl Direct S-2 N2455-029 1g/10ml

CH. 1 C.S 5.00 ATT 0 OFFS 0 09/27/89 05:51



TEMP: 130 200 C
IN OV-1
RT:ATTN ID ECD
TRACE 5500 -1
METH'S 400 /5000 /2000 /3150

I-2000 09/27/89 05:51

SAMPLE: TAG: 48 CH: 1

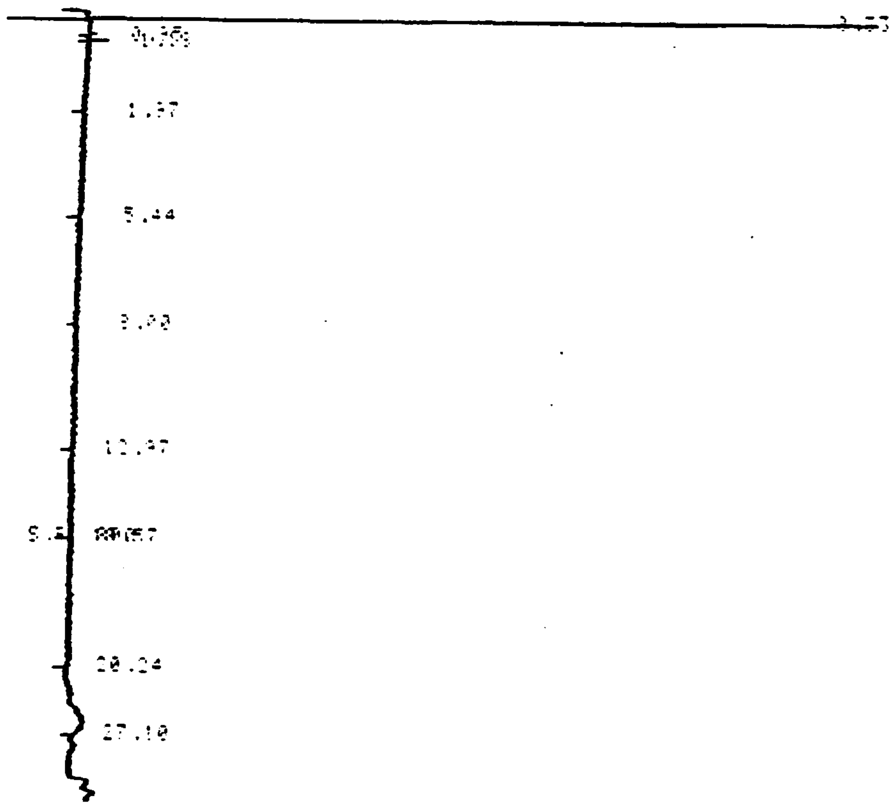
FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RPT	BC	NAME
1	0.32	4328	1187	0.32	BV	
2	0.50	362	40	0.50	TBB	
5	1.64	331	23	1.64	BB	
10	4.24	301	21	4.24	BB	
13	5.25	657	23	5.25	BB	
14	5.64	304	28	5.64	BB	
15	6.60	1019	23	6.60	BB	
16	7.02	376	24	7.02	PP	
17	7.44	389	26	7.44	BB	
19	8.34	330	23	8.34	BB	
22	10.00	443	25	10.00	BB	
27	14.50	390	23	14.50	BB	
29	15.64	566	20	15.64	BB	
31	17.04	320	16	17.04	BB	
32	17.97	701	19	17.97	BB	
37	22.41	518	20	22.41	BB	
38	23.36	736	14	23.36	BB	
40	27.30	4712	83	27.30	BB	
TOTAL						
		17683	1638			

100824

2ul Direct N2455-030

CH. 1 C.S 5.00 ATT 0 OFFS 0 09/26/89 00:46



TEMP: 130 280 C
3% OV-1
6FT:4MM ID ECD
TRACOR 550A -1
METH'S 602 /5098 /5080 /8150

D-2000 09/26/89 00:46

SAMPLE: TAG: 60 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.33	7355	1507	0.33	BB	
2	0.95	1836	26	0.95	BB	
4	1.97	1459	12	1.97	PB	
5	5.44	386	6	5.44	BB	
6	8.00	2021	15	8.00	BB	
7	12.97	1000	5	12.97	BB	
8	18.57	1362	17	18.57	BB	
9	20.24	2935	15	20.24	BB	
10	27.10	782	17	27.10	BB	
TOTAL		16642	1614			

PEAK REJ : 299

RAW DATA STORAGE NO. 34

100825

nytest environmental inc

SURROGATE PERCENT RECOVERY SUMMARY

Laboratory: NYTEST ENVIRONMENTAL INC. Project No: 89-16154

	VOLATILE			BASE NEUTRAL			ACIDS			PESTICIDES
SMO TRAFFIC NO.	TOLUENE-D8 (75-130)	BFB (75-130)	1,2 DICHLORO-ETHANE-D4 (75-130)	NITRO-BENZENE-D5 (10-150)	2-FLUORO-BIPHENYL (10-150)	TERPHENYL-D14 (10-150)	PHENOL-D5 (10-150)	2-FLUORO-PHENOL (10-150)	2,4,6 TRIBROMO-PHENOL (10-150)	** DIBUTYL-CHLORENDATE (10-160)
Blank										66
1										163 *
2										45
3										30
4										27
5										25
6										25
7										29
8										33
9										37
10										D *
11										32
12										36
13										41
14										34
15										35
16										29
17										30
18										5 *
20										5 *
21										6 *
22										- *
23										- *
24										- *
26										8 *

* OUTSIDE QC LIMITS
** ADVISORY LIMITS ONLY

Volatiles out of ; outside of
Semi-Volatiles out of ; outside of
Pesticides: 9 out of ~~26~~ 25 ; outside of QC limits

Comments:

100826

nytest environmental inc

SURROGATE PERCENT RECOVERY SUMMARY

Laboratory: NYTEST ENVIRONMENTAL INC.

Project No: 89-16154

	VOLATILE			BASE NEUTRAL			ACIDS			(PESTICIDES)
SMO TRAFFIC NO.	TOLUENE-D8 (75-130)	BFB (75-130)	1,2 DICHLORO-ETHANE-D4 (75-130)	NITRO-BENZENE-D5 (10-150)	2-FLUORO-BIPHENYL (10-150)	TERPHENYL-D14 (10-150)	PHENOL-D5 (10-150)	2-FLUORO-PHENOL (10-150)	2,4,6 TRIBROMO-PHENOL (10-150)	** DIBUTYL-CHLORENDATE (10-160)
27										19
S-1										104
S-2										28
5A										5 *

* OUTSIDE QC LIMITS
** ADVISORY LIMITS ONLY

Volatiles out of ; outside of
Semi-Volatiles out of ; outside of
Pesticides: 1 out of 4 ; outside of QC limits

Comments:

nytest environmental

SOIL MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Contractor: NYTEST ENVIRONMENTAL INC.

Project No: 89-16154

FRACTION	COMPOUND	CONC. SPIKE ADDED (ug)	SAMPLE RESULT	CONC. MS	% RECOVERY	CONC. MSD	% RECOVERY	RPD	QC LIMITS * RPD	QC LIMITS * RECOVERY
VOA	1,1-Dichloroethene								22	59-172
SMO	Trichloroethene								24	62-137
SAMPLE NO.	Chlorobenzene								21	60-133
	Toluene								21	59-139
	Benzene								21	66-142
B/N	1,2,4-Trichlorobenzene								23	38-107
SMO	Acenaphthene								19	31-137
SAMPLE NO.	2,4-Dinitrotoluene								47	28-89
	Pyrene								36	35-142
	N-Nitroso-Di-n-Propylamine								38	41-126
	1,4-Dichlorobenzene								27	28-104
ACID	Pentachlorophenol								47	17-109
SMO	Phenol								35	26-90
SAMPLE NO.	2-Chlorophenol								50	25-102
	4-Chloro-3-Methylphenol								33	26-103
	4-Nitrophenol								50	11-114
	Lindane	800.00	0.00	893.08	111.64	910.94	113.87	1.98	50	46-127
PEST	Heptachlor	800.00	0.00	966.59	120.82	1020.30	127.54	5.41	31	35-130
SMO	Aldrin	800.00	0.00	902.56	112.82	920.60	115.08	1.98	43	34-132
SAMPLE NO.	Dieldrin	2000.00	0.00	1606.69	80.33	1658.68	82.93	3.18	38	31-134
89-035	Endrin	2000.00	0.00	2148.40	107.42	2293.67	114.68	6.54	45	42-139
	4,4'-DDT	2000.00	0.00	3500.76	175.04 *	3570.98	178.55 *	1.99	50	23-134

* ASTERISKED VALUES ARE OUTSIDE QC LIMITS.

RPD:	VOAs		out of		;outside QC limits	RECOVERY VOA'S		out of		;outside QC limits
	B/N		out of		;outside QC limits	B/N		out of		;outside QC limits
	ACID		out of		;outside QC limits	ACIDS		out of		;outside QC limits
	PEST	0	out of	6	;outside QC limits	PEST	2	out of	12	;outside QC limits

Comments:

nytest environmental inc

METHOD BLANK SUMMARY

Contractor:NYTEST ENVIRONMENTAL INC.

Project No: 89-16154

FILE ID	DATE OF ANALYSIS	FRACTION	MATRIX	CONC. LEVEL	INST. ID	CAS NUMBER	COMPOUND (HSL,TIC OR UNKNOWN)	CONC.	UNITS	CRQL
Blank	09/22/89	Pest	Waste	Med	5500-1		No Compounds Found			

Comments:

REFERENCE NO. 30

NUS CORPORATION AND SUBSIDIARIES — **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
02-9006-03	7/16/90	1130

DISTRIBUTION:
TO FILE: Li TUNGSTEN

BETWEEN:	OF:	PHONE:
DANIEL RUSSELL	CITY HISTORIAN OF GLEN COVE, N.Y.	(516) 676-6535

AND:
STEVEN OKULEWICZ (NUS)

DISCUSSION:

I SPOKE WITH MR. RUSSELL ABOUT THE Li TUNGSTEN SITE IN GLEN COVE, N.Y. I ASKED HIM ABOUT WASTE DISPOSAL FROM THE SITE. HE SAID MATERIAL FROM Li TUNGSTEN WAS DUMPED IN A CITY OWNED LANDFILL AT THE END OF GARVIES POINT ROAD, ON ITS SOUTHERN SIDE. THIS WAS A MUNICIPAL LANDFILL THAT WAS CLOSED IN THE EARLY 1970'S. HE TOLD ME MR. ROBERT MANGAN OF THE DEPT. OF PUBLIC WORKS (516-676-7000) WOULD HAVE THE EXACT CLOSING DATE. THE LANDFILL IS LOCATED IN BLOCK 759, LOT 1, SECTION 21. THE LAND WAS SOLD TO MR. JACK QUINN A FINANCIER WHO BEGAN CONSTRUCTION OF A CONDOMINIUM PROJECT (1982-1983) CALLED GATSBY LANDING OR CAPTAINS COVE CONDOMINIUMS. CONSTRUCTION WAS HALTED OF THE CONDOS DUE TO: 1) FINANCIAL PROBLEMS, 2) A METHANE GAS PROBLEM, 3) THE DISCOVERY OF HAZARDOUS WASTE ON THE SITE INCLUDING

ACTION ITEMS:

RADIOACTIVITY. MR. RUSSELL BELIEVES THAT HART ENVIRONMENTAL, THE DEC AND THE NASSAU COUNTY DEPT OF HEALTH, SAMPLED THIS AREA, AND SHOULD HAVE ANALYTICAL RESULTS AVAILABLE FOR STUDY.

NUS 067 REVISED 0685

REFERENCE NO. 31

ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ENFORCEMENT
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER
BUILDING 53, BOX 25227, DENVER FEDERAL CENTER
DENVER, COLORADO 80225

DATE: August 2, 1990

MEMORANDUM

SUBJECT: NEIC Report Regarding Long Island Tungsten Site Analyses

FROM: Charles R. Aschwanden, Acting Chief
Enforcement Specialist Office

TO: Douglas R. Blazey, Esq.
Regional Counsel
U.S. EPA, Region II

Barbara Metzger, Director
Environmental Services Division
U.S. EPA, Region II

Attached is the subject report. If there are any questions, please contact Mike Ketterer at FTS 776-5132.

Attachment

cc: [redacted] Chief, Surveillance and Monitoring Branch, ESD, EPA Reg. II

RECEIVED
AUG 06 1990
Director, ESD Division

100833

ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ENFORCEMENT
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER
BUILDING 53, BOX 25227, DENVER FEDERAL CENTER
DENVER, COLORADO 80225

DATE August 1, 1990

MEMORANDUM

SUBJECT: Analytical Results for Samples from the Long Island Tungsten CERCLA Site, Glen Cove, NY

FROM: Michael E. Ketterer, Ph.D. NEIC Project Coordinator

TO: Joe H. Lowry, Chief Chemistry Branch

SUMMARY

On June 18, 1990, NEIC received custody of eleven water samples and eighteen soil/sediment samples. Tungsten was determined in the water and solid samples using inductively coupled plasma mass spectrometry (ICP/MS). Analytical results indicated the presence of tungsten in the water and solid samples at unusually elevated levels.

Qualitative analysis by ICP/MS indicated the presence of the following suite of elements in one or more of the water samples: copper, zinc, arsenic, molybdenum, antimony, tungsten, lead, bismuth, thorium, and uranium. Tests for the fused solid samples indicated the presence of the following group of elements at elevated levels in one or more of the samples: manganese, iron, copper, zinc, arsenic, niobium, molybdenum, silver, tin, antimony, rare earth elements, tantalum, tungsten, lead, bismuth, thorium, and uranium.

WATER SAMPLES

Eleven water samples were received in one-liter polyethylene bottles. Visual inspection indicated that no filtration had been performed; the pH of all samples was close to 7.0, suggesting that no preservation had been performed. Addition of an acid preservative is not recommended for samples in which tungsten is to be determined, since insoluble tungstic oxide can slowly form at pH's lower than 3. The water samples were filtered at NEIC through a 0.45 um membrane unit; two subsamples were prepared. One subsample was left unpreserved (for tungsten determinations), and a second was preserved with nitric acid to a pH of less than 2; the latter portions were archived.

Tungsten was determined in the filtered, unpreserved portions by ICP/MS. Iridium at 0.5 mg/liter was used as an internal standard. The mass spectrometer was used in the low resolution mode, with multichannel monitoring (i.e. selected ion monitoring) to collect a total of 15 seconds of data per analytical mass. Tungsten was monitored at m/z 182, 183, and 184; iridium was monitored at m/z 191 and 193. Calibration was performed with standards containing 0, 0.050, 0.100, 0.250, 0.500, and 1.00 mg/L tungsten in deionized water. The calibration was verified with the analysis of the 0 mg/l tungsten standard and one of the tungsten-containing standards approximately every 10 samples. Samples containing greater than 1 mg/L tungsten were diluted appropriately. Five laboratory blanks were prepared from deionized water; these were filtered in the same manner as the samples. The five laboratory blanks were evenly interspersed amongst the samples; the results were used to calculate a detection limit of 0.002 mg/L tungsten (3.75*S.D., where 3.75 is the t-factor for four degrees of freedom, 99% C.L.). Precision and bias of the results were estimated through triplicate determination of tungsten in three samples, and the determination of tungsten in three spiked samples.

Analytical results for the determination of tungsten in water are presented in Table I. Table II lists precision and accuracy results for these determinations.

SOIL AND SEDIMENT SAMPLES

Eighteen soil and sediment samples were received in eight ounce glass jars. The custody sheets identified two jars from Station S-1; only one jar was received. The custody sheets also identified a sample SED-1; no sample SED-1 was received, although a SED-4 was received which was not mentioned on the sheets. These samples were received in an as-collected state and were processed at NEIC to produce subsamples representative of the material received. Excess water present in some of the samples was decanted and discarded. All samples were dried to constant weight at 90^{o} C (about 72 hours). The entire sample was sieved with a 25 mesh sieve; aggregates were broken up using light mashing in an agate mortar and pestle; the +25 mesh material was archived. For most samples, the +25 mesh material contained extraneous material such as pebbles, twigs, and decaying vegetable matter. A portion of the -25 mesh material (about 30 g) was split out and ground to ~ 100 mesh using a motorized ceramic mortar and pestle. Sea sand was used to decontaminate the grinding apparatus between samples; ground and unground sea sand was analyzed, and no tungsten contamination was found to originate from the grinding apparatus. The ~100 mesh ground subsample was suitable for fusion.

Samples were fused by combining ~0.25 g of ground sample with 2.0 g of KOH in a pyrolytic graphite crucible. The crucibles were placed in an electric muffle furnace, and were heated stepwise for one hour at three temperatures: 150°, 300°, and 450° C. The melts were permitted to cool and were dissolved in deionized water, nitric acid, and hydrogen peroxide. The samples were brought up to 100 ml, and were filtered using a 0.45 um membrane filter unit. The final sample matrix contained 2 g of KOH, to which 6 ml of 70 wt.% HNO_3 and 1 ml of 30 wt.% H_2O_2 had been added to form an acidified potassium nitrate matrix. Precision and bias of the results were estimated through the preparation of five fusion blanks, the duplicate fusion of USGS Exploration Sample GXR-3, the triplicate fusion of two samples, and the fusion of two samples which were spiked prior to fusing. In addition, as mentioned above, grinding apparatus decontamination samples were fused.

Tungsten was determined in the fused solid samples using ICP/MS; the procedure was as mentioned above for water samples. Iridium was again used as an internal standard. All fusion blanks and samples were diluted twentyfold with deionized water prior to ICP/MS analysis in order to reduce the dissolved salts concentration to a tolerable level. Standards for solid sample analysis were matrix-matched to contain the same level of KNO_3 as the samples. The linear calibration range for tungsten determination in fused samples was 0-2.0 mg/l. Measurement triplicates and post-digestion spikes were also performed. A detection limit of 50 mg/Kg tungsten was calculated based on the results of the five interspersed fusion blanks, using the previously mentioned protocol, and including the overall sample dilution correction factor of 8000.

Analytical results for the determination of tungsten in solid samples are presented in Table III. Table IV depicts precision and accuracy results for these determinations.

ICP/MS MULTIELEMENT SCREENING ANALYSIS

The water and fused solid samples were analyzed qualitatively by ICP/MS. Mass spectra were acquired in the mass range 52-240 using multichannel (peak-hopping) scanning, with a measurement time of 0.3 seconds per mass. Blanks and multielement comparison standards were also scanned. These tests indicated the presence of the following suite of elements in one or more of the water samples: copper, zinc, arsenic, molybdenum, antimony, tungsten, lead, bismuth, thorium, and uranium. Tests for the fused solid samples indicated the presence of the following group of elements at elevated levels in one or more of the samples: manganese, iron, copper, zinc, arsenic, niobium, molybdenum, silver, tin, antimony, rare earth elements, tantalum, tungsten, lead, bismuth, thorium, and uranium.

TABLE I. Results for the Determination of Tungsten by ICP/MS in Water Samples from the Long Island Tungsten CERCLA Site, Glen Cove, NY

SAMPLE	TUNGSTEN, mg/L
SW-1	0.837
SW-1A	4.89
SW-2	2.46
SW-2A	9.01
SW-3	4.06
SW-4	0.811
SW-6	0.176
SW-7	0.037
SW-8	0.003
SW-9	0.014
SW-10	41.0

TABLE II. Precision and Bias Results for the Determination of Tungsten by ICP/MS in Water Samples from the Long Island Tungsten CERCLA Site, Glen Cove, NY

A. TRIPLICATE RESULTS.

SAMPLE	TUNGSTEN, mg/L	RELATIVE STANDARD DEVIATION
SW-1	0.837	1.2 %
SW-6	0.176	0.1 %
SW-10	41.0	2.7 %

B. SPIKE RESULTS.

SAMPLE	TUNGSTEN, mg/L	SPIKE LEVEL	PERCENT RECOVERY
SW-1	0.837	1.00	105
SW-6	0.176	0.250	101
SW-10	41.0	25.0	90

TABLE III. Results for the Determination of Tungsten by ICP/MS in Solid Samples from the Long Island Tungsten CERCLA Site, Glen Cove, NY

SAMPLE	TUNGSTEN, mg/Kg (DRY WEIGHT BASIS)
S-1	930.
SED-1A	19800.
S-2	42700.
SED-2	10700.
S-3	11000.
SED-3	8540.
S-4	9530.
SED-4	9110.
S-5	28500.
S-6	6350.
SED-6	1040.
S-7	1350.
SED-7	600.
S-8	960.
SED-8	160.
S-9	12000.
SED-9	3820.
S-10	370.

TABLE IV. Precision and Bias Results for the Determination of Tungsten by ICP/MS in Solid Samples from the Long Island Tungsten CERCLA Site, Glen Cove, NY

A. TRIPLICATE RESULTS.

SAMPLE	TUNGSTEN, MG/KG	RELATIVE STANDARD DEVIATION
S-1	930.	3.7%
SED-4	9110.	2.0%

B. SPIKE RESULTS.

SAMPLE	TUNGSTEN, MG/KG	SPIKE LEVEL	PERCENT RECOVERY
S-1	930.	4820.	100
SED-4	9110.	4820.	117

C. GXR-3 QUALITY CONTROL SAMPLE RESULTS.

USGS PUBLISHED RESULTS[a]	RESULTS, THIS STUDY
11100 +/- 1100 mg/kg W	12300, 12200 mg/kg W

[a]Gladney, Burns, and Roelandts, **Geostandards Newsletter**, **8**, pp. 119-154 (1984)

TO: Dr. Richard Spear **DATE:** June 11, 1990
FROM: Raymond J. Bath
SUBJECT: LI Tungsten - NEIC Analyses

Per my discussions with Mike Kitterer of NEIC, Denver, CO (303-236-5132), NEIC has agreed to assist us in the tungsten analysis of the soil and water samples using ICP-MS. The FIT has collected 20 soil samples and 22 water samples. The water samples are not acidified. The samples are scheduled to be shipped on June 15 with a full report by Aug. 1. NEIC requests a letter from you requesting the regions help for this analysis.

The letter should be adressed to:

Mike Kitterer
NEIC, Bldg. 53, Door W1
Box 25227
Denver Federal Center
Denver, CO 80725

100842

REFERENCE NO. 32

TUNGSTEN:

MINERALOGY, GEOCHEMISTRY, AND EXTRACTIVE METALLURGY

By Daniel E. Russell
Harbormaster
City of Glen Cove

August, 1989

TA/0189

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TUNGSTEN:

MINERALOGY, GEOCHEMISTRY, AND EXTRACTIVE METALLURGY

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THE MINERALOGY OF TUNGSTEN

by Daniel E. Russell
Harbormaster
City of Glen Cove

INTRODUCTION

Tungsten occurs in nature as a principal component of only 29 known mineral species [Table I]. Of these species, most are tungstates, oxides, or hydroxides; only three sulphides (tungstenite, as 2H and 3R dimorphs, and kiddcreekite) and one silicate (scheteligite) have been identified to date. This can be explained by tungsten's strong affinity for oxygen. Although tungsten may have a valency of +2, +4, +5 and +6, its occurrence in mineral species is predominantly as hexavalent W.

Only scheelite and the principal members of the wolframite series (wolframite, huebnerite, and ferberite) are of economic interest. The crystallochemical properties of these four species have been summarized in the appendix to this paper.

ISOMORPHISM IN THE TUNGSTEN MINERALS

A variety of isomorphous substitutions are possible within the tungsten minerals, based on ionic radii and valence requirements.

Predominant among these is the substitution of Mo for W. The ionic radius for Mo^{+6} is 0.59 A which is identical to the ionic radius of W^{+6} at 0.59A. A theoretical isomorphous series exists between scheelite ($CaWO_4$) and powellite ($CaMoO_4$); however, it should be noted that not all intermediate compositions have been observed, giving rise to the informal varietal names of "molybdoscheelite" (containing about 8% Mo), "seyrigite" (containing about 24% Mo), and "tungstopowellite" (containing about 10 to 14% W). A similar W/Mo isomorphous series has been hypothesized with stolzite ($PbWO_4$) and wulfenite ($PbMoO_4$); an intermediate variety, "chillagite", containing between 21 and 29.5 % W has been observed. However, although trace amounts of Mo have been observed, there is little evidence of any isomorphous series existing between members of the wolframite series and their theoretical molybdenum end members of

$MnMoO_4$ and $FeMoO_4$.

Nb and Ta are also capable of substituting in part for W. Substitution of up to 2% Nb or Ta is not uncommon, and a niobian wolframite from Mozambique, containing more than 20% by weight of Nb_2O_5, has been reported. Further, W may substitute for Nb and Ta in many of the species of those elements. Columbites with 1% W are not uncommon, and a columbite with 13% W has been observed. In such instances, W recovery ancillary to recovery of Nb/Ta from such ores would be economically feasible. Special note should be made of the similarity of the wolframite series and columbite series crystal lattices. Similar substitution has been observed in tapiolite, dimorphous with tantalite.

Ti may also substitute in part for W, especially in Nb-Ta containing systems such as yttrocrase and scheteligite. The W-Ti system appears to be little explored in the literature.

Hexavalent Re has an ionic radii very similar to W and Mo (0.60 A), and could in theory substitute for W. However, the author is not familiar with any reports of Re-bearing wolframite series or scheelite. It is probable that Re levels are instead strongly depleted by xllization of molybdenite earlier in the paragenetic sequence, as Re concentration in that species is well documented. Re-bearing tungstenite is a theoretical possibility.

With regards to possible substitutions for Fe and Mn in the wolframite series, both Sc and REE's have been noted. Zn replaces part of the Fe in sanmartinite, an uncommon member of the wolframite series reported from Los Cerillos, Argentina.

There has been much written about the potential substitution of Ca for Fe-Mn; the observed solid solution data appears somewhat contradictory. Exsolution of scheelite in ferberite has been observed. In general, under ambient conditions Ca cannot replace Fe-Mn at levels greater than 1%, but under conditions of elevated temperature (1,100 degrees C) 10 mol % $MnWO_4$ can be dissolved in scheelite, and 2.5 mol % $CaWO_4$ can be dissolved in huebnerite.

Cu can substitute in part for Ca, replacing about 4% of Ca in the scheelite variety "cuproscheelite". A cuprian tungstate or hydroxyltungstate, cuprotungstite, is known but is poorly defined, and there is insufficient data to determine whether or not it represents a Cu end-member in a possible solid solution series with scheelite. There is some preliminary indications that its symmetry is tetragonal.

There appears to be little information on the substitution of Y and REE's for Ca in scheelite, despite the similarity in ionic radii, and the frequency with which this substitution occurs in other species.

DESCRIPTION OF THE TUNGSTEN MINERALS

It will be noted that tungsten minerals fall genetically into two distinct groups: primary species (such as wolframite and scheelite), and secondary species formed by the alteration of primary W species. The later consist of W oxides and hydroxides (the "tungsten ochres"), many of which conform to variants of tungstic acid salts, mixed with other metallic cations.

The following species have been identified as containing W as a primary constituent. Varietal names, not recognized by IMA as discreet species, are given in quotation marks.

The wolframite series consists of four mineral species, ferberite, huebnerite, wolframite, and sanmartinite, which can be regarded essentially to be a isomorphous series of monoclinic (pseudo-orthorhombic) iron, manganese and zinc tungstates. Ferberite is the iron end-member, and huebnerite is the manganese end member, while wolframite comprises intermediate compositions. Excepting the rather rare sanmartinite, these species, together with scheelite, compose the primary W ore minerals. The members of the wolframite series contain about 76% WO_3. A detailed summary of the crystallochemical properties of these species are provided in the appendix. Differentiation of the various members of the wolframite series is largely by convention only. Ferberite traditionally contains no more than 20% dissolved huebnerite, while huebnerite traditionally contains no more than 20% dissolved ferberite. Any mineral containing intermediate values is deemed wolframite. The miscibility of the Fe and Mn end members appears to be complete at temperatures of formation greater than 400 degrees C; below that temperature, nearly pure end members are formed. Concentric zoning within xls due to differing Fe/Mn ratios are commonly observed, caused by variations in formation temperature and pH (ferberite requires an acid solution, while huebnerite requires a neutral to alkaline environment). Sanmartinite is the iron-zinc end member of the series, and is extremely uncommon, to date being only reported from Los Cerillos, Argentina. "Reinite" is polycrystalline ferberite pseudomorphous after scheelite. "Niobian wolframite" is a high-Nb (20 wt% Nb_2O_5) variety reported from Mozambique.

Scheelite is a tetragonal calcium tungstate which forms a solid solution series with powellite ($CaMoO_4$). A summary of its crystallochemical properties is given in the appendix. Along with members of the wolframite series, scheelite comprises the primary W ore species, containing 80.5% WO_3 when Mo contamination is absent. Xls often display concentric zonation, usually due to variations of Mo content. Fluorimetry can rapidly assess the presence of Mo contamination in scheelite above 0.3% based on the consistent, nearly diagnostic response of scheelite and powellite under ultraviolet radiation at 254 nanometers. Scheelite with a Mo content of 0.0 to 0.3 % displays a strong blue-white response; at between 0.3 to 1.0 % Mo, the response is an intense white; greater percentages of Mo change the fluorescent response to golden-yellow.

The fluorescent response of powellite is a golden-yellow to yellow-brown. Varieties between the pure end members of scheelite and powellite include "molybdoscheelite" (8% Mo), "seyrigite" (24% Mo) and "tungstopowellite" (14% W). "Cuproscheelite" contains 4% Cu; whether or not this variety represents an intermediate composition between scheelite and cuprotungstite is uncertain. The crystallographic data on cuprotungstite is presently inadequate, and while the implied tetragonal symmetry is suggestive, the existence of an isomorphous series between the two species is not confirmed.

Stolzite is a tetragonal lead tungstate, dimorphous with raspite. It is isostructural with scheelite and forms an isomorphous series with wulfenite ($PbMoO_4$). It is a common species in oxidized zones associated with W deposits. "Chillagite" is a W-bearing (ca. 25 %) wulfenite.

Raspite is a monoclinic lead tungstate, dimorphous with stolzite. Its crystal structure is similar to wolframite series minerals, but no solid solution series between them appears to exist. At 400 degrees C, the raspite lattice inverts to that of stolzite.

Alumotungstite is an isometric aluminum tungsten oxide-hydroxide, and is the Al analogue of ferritungstite. The crystallochemical properties of the species are poorly defined. Fe may be present indicating a limited solid solution series with ferritungstite. Analyses indicate the presence of non-stoichiometric Pb (as much as 10 wt %), Ca, and zeolitic water in some specimens. Alumotungstite was first reported from Malaysia, associated with yttrotungstite an alteration product of primary W species. {Ref: Min.Rec. Vol.12, 82-85 (1981)}

Anthoinite is a hydrous aluminum tungsten oxide-hydroxide, of either monoclinic or triclinic symmetry. It is derived from the alteration of primary W species. {Ref: Min.Rec. Vol.12, 82-85 (1981)}

Cerotungstite is a monoclinic cerium hydroxyl tungstate, and may be regarded as the Ce analogue of yttrotungstite. Other REE's (especially Nd) may replace Ce, and a total of 24% REE oxides may be present. An alteration product of primary W species. {Ref: Amer.Min. Vol. 57, 1558 (1972)}

Cuprotungstite is a tetragonal copper hydroxyl tungstate. The species is poorly defined. Although some early workers have suggested that cuprotungstite may be the end-member in an isomorphous series with scheelite, it appears more probable that the species is derived from the alteration (with addition of Cu) of scheelite. {Ref: Amer.Min. Vol.17, 234-237 (1932)}

Ferritungstite is an isometric (originally described as tetragonal) hydrous iron tungsten oxide/hydroxide derived from the alteration of primary W species. Al is present in some analyses indicating a limited solid solution series with its Al analogue, aluminotungstite. Non-stoichiometric Pb and Ca are sometimes present, as well as zeolitic water. XRD data indicates a structural similarity to members of the pyrochlore group, especially koppite. The species was first described from Washington, USA, in 1911. {Ref: Min.Rec. Vol.12, 82-85 (1981)}

Hydrotungstite is a monoclinic (pseudo-orthorhombic) hydrous tungstic acid, $H_2WO_4+H_2O$. The water appears to be zeolitically bound, being driven off at ca. 120 degrees C. It occurs as an alteration product of primary W species. {Ref: Amer.Min. Vol.29, 192-210 (1944)}

Jixianite is an isometric lead tungsten iron oxide/hydroxide, structurally related to the pyrochlore and stibiconite groups. {Ref: Amer.Min. Vol. 64, 1330 (1979)}

Kiddcreekite is a isometric copper tin tungsten sulphide, Cu_6SnWS_8, first reported in 1985. It is isostructural with hemusite (Cu_6SnMoS_8) and it is probable that a solid solution series exists between these two analogues. The type locality is the Kidd Creek Mine, Timmons, Ontario, Canada. {Ref: Amer.Min. Vol. 70, 437 (1985); also Can.Min. Vol 22, 227-232 (1984)}

Meymacite is an amorphous hydrous tungstic acid with a composition similar to hydrotungstite. It is the X-ray amorphous analogue of tungstite. It occurs as an alteration product of primary W species. {Ref: Amer.Min. Vol.53, 1065 (1968)}

Mpororoite is a triclinic hydrous tungsten aluminum hydroxide, derived from the alteration of primary W species. {Ref: Amer.Min. Vol. 58, 1112 (1973); Vol. 70, 1334-1335 (1985); Min.Rec. Vol 12, 83 (1981)}

Phyllotungstite is an orthorhombic hydrous calcium iron hydrogen tungstate, recently reported from the Clara mine in W. Germany. An alteration product of primary W species. {Ref: Amer.Min. Vol. 71, 846 (1986); also Walenta (1984)}

Qitianglinite is an orthorhombic iron niobium tungsten oxide.

Rankachite is a recently-described orthorhombic hydrous calcium iron vanadium tungstate from the Clara mine in West Germany. It is an alteration product of primary W minerals. {Ref: Amer.Min. Vol. 70, 876 (1985); also Walenta and Dunn, 1984}

Russellite is a tetragonal bismuth tungstate derived from the alteration of primary W species. It is isomorphous with koechlinite, Bi_2MoO_6. {Ref: Amer.Min. Vol 23, 121 (1938)}

Scheteligite is a complex orthorhombic/pseudoisometric oxide-hydroxide of the general formula $X_2Y_2O_6(O,OH)$, where X = Ca,Y,Sb,Mn, and Y = Ti,Ta,Nb,W. It may be a member of the pyrochlore group. It is usually metamict. {Ref: Amer.Min. Vol.23, 293 (1938)}

Tungstenite is a tungsten sulphide. Until the discovery of kiddcreekite, it was the only known sulphide of tungsten. Its occurrence is extremely rare. Two modifications exist: 2H, which is hexagonal and is isostructural with molybdenite-2H; and 3R, which is trigonal and is isostructural with molybdenite-3R. A complete solid solution series appears to exist between the respective dimorphs of tungstenite and molybdenite. It is possible that the tungsten equivalent of the amorphous molybdenum sulphide jordisite may exist. {Ref: Amer.Min. Vol.3, 30 (1918); Can.Min. Vol.10,729-732 (1970)}

Tungstite is naturally occurring tungstic acid, H_2WO_4, xllizing in the orthorhombic system. It occurs as an alteration product of primary W species. {Ref: Amer.Min. Vol.29, 192-210 (1967)}

Uranotungstite is an orthorhombic hydrous barium uranium iron uranyl hydroxyl tungstate, recently discovered at the Clara Mine, W.Germany. An alteration product of primary W species. {Ref: Amer.Min. Vol.36, 487 (1985); also Walenta (1985)}

Welinite is essentially a hexagonal tungsten manganese hydroxysilicate. The proportions of W to Mn are variable, indicating a possible solid solution series between theoretical pure Mn and W end-members. W has been reported to replace Mn to about 15 mol %. Traces of Fe, Sb and Mg were observed. The type locality is Langban, Sweden, a location long noted for aberrant mineralogy. {Ref: Amer.Min. Vol.53, 1064 (1968)}

Wolframoixiolite is a monoclinic (?) oxide of the general formula X_2O_6, where X = Nb,Ta,W,Fe,Mn,Ti,Zr,U,Ca,Mg. At present, the structure has not been adequately characterized, and Fleischer comments that its species status is dubious. The initial description showed additional traces of Ti,Zr,U,Ca,and Mg at about 0.05 mol % or less, plus water. Radiogenic haloes in surrounding microcline were noted. The anisotropy of the specimens indicates a general absence of extensive metamictization. {Ref: Amer.Min. Vol. 55, 318 (1970)}

Yttrocrase is an orthorhombic oxide with the general formula $XY_2(O,OH)_6$, where X = Y,Th,U,Ca and Y = Ti,Fe,W. It is structurally related to euxenite. Specimens containing up to 1.8% WO3 have been observed. It is usually metamict.

Yttrotungstite is a monoclinic yttrium lanthanum hydroxyl tungstate. The species exhibits extensive isomorphous substitution of Y group and La group elements, with the ratio of Y group elements to La group about 3:1. The total of REE's is about 21%. "Thorotungstite", once thought to be a discreet species, is now classed as a Th-bearing variety of Yttrotungstite. An alteration product of primary W species. {Ref: Amer.Min Vol.36, 641 (1951)}

TABLE I:

GLOSSARY OF TUNGSTEN MINERALS

Alumotungstite	$(W,Al)(O,OH)_3$ Isometric
Anthoinite	$WAl(O,OH)_3$ Triclinic
Cerotungstite	$CeW_2O_3(OH)_3$ Monoclinic
Cuprotungstite	$Cu_2(WO_4)(OH)_2$ Tetragonal
Ferberite	$FeWO_4$ Monoclinic
Ferritungstite	$Ca_2Fe_2Fe_2(WO_4)_7+9H_2O$ Tetragonal
Huebnerite	$MnWO_4$ Monoclinic
Hydrotungstite	$H_2WO_4+H_2O$ Monoclinic
Jixianite	$Pb(W,Fe)_2(O,OH)_7$ Isometric
Kiddcreekite	Cu_6SnWS_8 Isometric
Meymacite	WO_3+2H_2O Isometric
Mpororoite	$WAlO_3(OH)_3+2H_2O$ Triclinic
Phyllotungstite	$CaFe_3H(WO_4)_6+4H_2O$ Orthorhombic
Qitianglinite	$Fe_2Nb_2WO_{10}$ Orthorhombic
Rankachite	$CaFeV_4W_8O_{36}+6H_2O$ Orthorhombic

Raspite	$PbWO_4$ Monoclinic
Russellite	Bi_2WO_6 Tetragonal
Sanmartinite	$(Zn,Fe)WO_4$ Monoclinic
Scheelite	$CaWO_4$ Tetragonal
Scheteligite	$(Ca,Y,Sb,Mn)_2(Ti,Ta,Sb,W)_2O_6(O,OH)$ Orthorhombic
Stolzite	$PbWO_4$ Tetragonal
Tungstenite-2H	WS_2 Hexagonal
Tungstenite-3R	WS_2 Trigonal
Tungstite	WO_3+H_2O Orthorhombic
Uranotungstite	$(Ba,Pb,Fe)(UO_2)_2(WO_4)(OH)_4+12H_2O$ Orthorhombic
Welinite	$(Mn,W)_{1-X}(Mn,W,Mg)_{3-Y}Si(O,OH)_7$ Hexagonal
Wolframite	$(Fe,Mn)WO_4$ Monoclinic
Wolframoixiolite	$(Nb,W,Ta,Fe,Mn)_3O_6$ Monoclinic
Yttrotungstite	$(Y,Th,Ca,U)(Ti,Fe)_2(O,OH)_6$ Orthorhombic

WOLFRAMITE

Formula: $(Fe,Mn)WO_4$

Crystal System: Monoclinic

Crystal Class: 2/m

Space Group: P2/c

Z = 2

Lattice Constants:

a: 4.78
b: 5.73
c: 4.98

beta: 89 34′

Axial ratio a:b:c: = 0.8343:1:0.8692

Prominent Powder XRD Lines:

I	dA	I	dA
6	4.78	1	1.881
5	3.761	1	1.836
5	3.673	2	1.775
10	2.968	1	1.733
9	2.946	2	1.729
3	2.864	2	1.719
4	2.488	2	1.716
1	2.460	1	1.594
2	2.392		
1	2.217		
1	2.217		
2	2.202		
1	2.023		
1	2.010		
1	1.911		

RADIATION: CuKa1
Lambda: 1.54056
Filter: Ni

Optical Constants:

alpha: 2.26 to 2.31
beta : 2.32
gamma: 2.42 to 2.46
Optically + 2V = 75

Indices decrease with increasing substitution of Mn for Fe.

Pleochroism: Weak reflection pleochroism noted.

Anisotropism: Distinct but not strong; brown to yellow-brown to green with uncrossed nicols. Red internal reflections common.

Reflectance Data (Polished Section):

Wavelength	R(max)	R(min)
420	19.0	16.5
440	18.4	16.0
460	18.0	15.7
480	17.7	15.5
500	17.4	15.2
520	17.2	15.1
540	17.0	15.0
560	17.0	15.0
580	16.9	14.9
600	16.9	14.9
620	16.9	14.9
640	16.8	14.9
660	16.7	14.9
680	16.7	14.9
700	16.6	14.9

Hardness: Mohs = 4.0 to 4.5
VHN100 = 312 - 342

Specific Gravity: (Meas.)
7.371 (Calc.)

Cleavage: {010} perfect
Fracture uneven. Brittle.

Habit: Xls usually short prismatic; also long prismatic, slightly tabular on {100}. Sometimes tabular or equant. Frequently striated parallel to direction of elongation. Lamellar or massive granular. Rarely as intergrown masses of acicular xls.

Twinning: Common on {100} or {023}

Color: Dark grey-black, brownish-black to iron-black.
Transparent to opaque.

Luster: Submetallic

Streak: Reddish brown to brownish-black to black

Chemistry: Iron manganese tungstate.

A complete solid solution series exists between ferberite ($FeWO_4$) and Huebnerite ($MnWO_4$). By convention, ferberite contains no more than 20 atomic percent substitution of Mn; wolframite contains 20 to 80 atomic per cent Mn by substitution, and huebnerite contains 80 atomic per cent substitution or greater of Mn. Ca may occur in trace quantities, possibly due to microscopic inclusions of scheelite. Nb and Ta have been reported in percentages to 2.2 weight per cent as $(Nb,Ta)_2O_5$; whether these elements occur via direct lattice substitution or as microscopic inclusions of columbite/tantalite is unknown. Trace amounts of Sc,In,Ti,V,Mo, and Al have been reported.

Zoning due to variations in xl chemistry has been noted in the series.

Mode of Occurrence: Chiefly in high-temperature hydrothermal ore veins and quartz veins associated with granitic bodies; in medium-temperature hydrothermal veins; infrequently in epithermal veins. As placer deposits.

Occurrences: South Dakota; New Mexico; Arizona; Canada; Argentina; Bolivia; France; Spain, Portugal; Germany; Czechoslovakia; USSR; Malaysia; Burma; Iran; Korea; Japan; Australia; South Africa; Namibia; China.

Common Mineral Associations: scheelite, arsenopyrite, stannite, stannoidite, mawsonite, native gold, bismuth, bismuthinite, tetradymite, molybdenite.

FERBERITE

Formula: $FeWO_4$

Crystal System: Monoclinic

Crystal Class: 2/m

Space Group: P2/c

Z = 2

Lattice Constants:

a: 4.730
b: 5.703
c: 4.952

beta: 90

Axial ratio a:b:c: = 0.828:1:0.870

Prominent Powder XRD Lines:

I	dA	I	dA	I	dA
2	5.72	5	2.195	1	1.586
8	4.69	5	2.189	4	1.504
6	3.75	2	2.047	1	1.453
5	3.65	2	1.999	2	1.436
10	2.94	1	1.900	2	1.429
2	2.85	1	1.870	1	1.318
6	2.476	1	1.819	1	1.316
6	2.470	2	1.763		
1	2.440	5	1.711		
2	2.366	5	1.708		

[JCPDS/ICDD]

RADIATION: CuKa1
Lambda: 1.54056
Filter: Ni

Optical Constants:

alpha: 2.255
beta : 2.305 {Li}
gamma: 2.414

Optically +

2V = 68

Indices decrease with increasing substitution of Mn for Fe.

Pleochroism: Weak reflection pleochroism noted.

Anisotropism: Distinct but not strong; brown to yellow-brown to green with uncrossed nicols.

Reflectance Data (Polished Section):

Wavelength	R(max)	R(min)
420	19.2	16.4
440	18.9	16.3
460	18.7	16.2
480	18.5	15.9
500	18.7	16.0
520	18.7	16.0
540	18.7	16.0
560	18.7	16.0
580	18.6	15.8
600	18.6	15.8
620	18.6	15.7
640	18.5	15.6
660	18.3	15.5
680	18.1	15.4
700	18.0	15.5

Hardness: 4.0 to 4.5

Specific Gravity: 7.51 (Meas.)
7.518 (Calc.)

Cleavage: {010} perfect

Habit: Commonly elongated [010], tabular on {001}; less frequently, short prismatic [001] and tabular on {010}. Xls frequently have wedge-shaped appearance. Frequently striated on [001]. As groups of bladed xls; massive.

Twinning: Common on both {100} and {023}. Usually as simple contact twins with composition face (100) or (001). Also as interpenetration twins, resembling Carlsbad twins. Rarely exhibiting lamellar twinning.

Color: Black

Luster: Submetallic

Streak: brownish-black to black

Chemistry: Iron tungstate.

A complete solid solution series exists between ferberite ($FeWO_4$) and Huebnerite ($MnWO_4$). By convention, ferberite contains no more than 20 atomic percent substitution of Mn; wolframite contains 20 to 80 atomic per cent Mn by substitution, and huebnerite contains 80 atomic per cent substitution or greater of Mn. Ca may occur in trace quantities, possibly due to microscopic inclusions of scheelite. Nb and Ta have been reported in percentages to 2.2 weight per cent as $(Nb,Ta)_2O_5$; whether these elements occur via direct lattice substitution or as microscopic inclusions of columbite/tantalite is unknown. Trace amounts of Sc,In,Ti,V,Mo, and Al have been reported.

Zoning due to variations in xl chemistry has been noted in the series.

Mode of Occurrence: Primarily in high-temperature hydrothermal ore veins and in quartz veins associated with granitic rocks.

Occurrences: Colorado (esp. Boulder Co.); Idaho; South Dakota; New Mexico; Arizona; Greenland; Bolivia; France; Spain; Germany; Australia; Portugal.

Common Mineral Associations: scheelite, arsenopyrite, stannite, stannoidite, mawsonite, native gold, bismuth, bismuthinite, tetradymite, molybdenite

HUEBNERITE

Formula: $MnWO_4$

Crystal System: Monoclinic   Crystal Class: 2/m

Space Group: P2/c   Z = 2

Lattice Constants:

a: 4.82
b: 5.76   beta: 91 16'
c: 4.97
Axial ratio a:b:c: = 0.8365:1:0.8679

Prominent Powder XRD Lines:

I	dA	I	dA
2	5.76	1	1.8871
6	4.84	1	1.8507
6	3.78	2	1.7843
5	3.70	2	1.7539
10	2.996	2	1.7440
9	2.954	3	1.7266
3	2.880	2	1.7196
5	2.497	1	1.5273
1	2.474	1	1.5221
1	2.237	1	1.5100
2	2.209	1	1.4886
1	2.057	1	1.4754
1	2.051		
1	2.021		

Radiation: CuKa1
Lambda: 1.5405
Filter: Ni

Optical Constants:

alpha: 2.17 to 2.20
beta : 2.22
gamma: 2.30 to 2.32
Optically +   2V = approx. 73

Indices increase with increasing substitution of Fe for Mn.

Pleochroism: Weak reflection pleochroism noted.

Anisotropism: Distinct but not strong; brown to yellow-brown to green with uncrossed nicols. Red internal reflections common.

Reflectance Data (Polished Section):

Wavelength	R(max)	R(min)
420	19.3	16.4
440	18.9	16.3
460	18.7	16.2
480	18.5	15.9
500	18.7	16.0
520	18.7	16.0
540	18.7	16.0
560	18.7	16.0
580	18.6	15.8
600	18.6	15.8
620	18.6	15.7
640	18.5	15.6
660	18.3	15.5
680	18.1	15.4
700	18.0	15.5

Hardness: 4.0 to 4.5

Specific Gravity: 7.18 (Meas.)
7.234 (Calc.)

Cleavage: {010} perfect.
Fracture uneven. Brittle.

Habit: Xls short to long prismatic, flattened or tabular {100}; commonly striated in direction of elongation. Commonly as groups of parallel or subparallel xls, or as radiating groups of xls.

Twinning: {100} common.

Color: Yellowish brown to reddish brown, rarely brownish-black. Transparent to translucent.

Luster: Submetallic to resinous

Streak: Yellow to reddish-brown to greenish-grey.

Chemistry: Manganese tungstate.

A complete solid solution series exists between ferberite ($FeWO_4$) and Huebnerite ($MnWO_4$). By convention, ferberite contains no more than 20 atomic percent substitution of Mn; wolframite contains 20 to 80 atomic per cent Mn by substitution, and huebnerite contains 80 atomic per cent substitution or greater of Mn. Ca may occur in trace quantities, possibly due to microscopic inclusions of scheelite. Nb and Ta have been reported in percentages to 2.2 weight per cent as $(Nb,Ta)_2O_5$; whether these elements occur via direct lattice substitution or as microscopic inclusions of columbite/tantalite is unknown. Trace amounts of Sc,In,Ti,V,Mo, and Al have been reported.

Zoning due to variations in xl chemistry has been noted in the series.

Mode of Occurrence: Chiefly in high-temperature hydrothermal ore veins and quartz veins associated with granitic bodies; in medium-temperature veins. Rarely in epithermal veins.

Occurrences: Colorado; Arizona; South Dakota; Idaho; Nevada; New Mexico; France, Czechoslovakia; Australia; Peru.

Common Mineral Associations: scheelite, arsenopyrite, stannite, stannoidite, mawsonite, native gold, bismuth, bismuthinite, tetradymite, molybdenite

SCHEELITE

Formula: $CaWO_4$

Crystal System: Tetragonal

Crystal Class: 4/m

Space Group: $I4_1/a$

Z = 4

Lattice Constants:

a: 5.246
c: 11.349

Axial ratio a:c = 1:2.1717

Prominent Powder XRD Lines:

I	dA	I	dA	I	dA
7	4.77	6	1.857	5	1.338
10	3.11	7	1.691	5	1.313
5	2.85	5	1.636	8	1.313
6	2.63	9	1.596	6	1.210
6	2.30	7	1.558	6	1.193
5	2.00	5	1.446	7	1.088
8	1.94	5	1.361		

Optical Constants:

omega: 1.9375
epsilon: 1.9208

wavelength = 570

Optically +   2V =

Birefringence = 0.017

Indices decrease with increasing substitution of Mo.

Pleochroism: None noted in polished section.

Anisotropism: Not noted in polished section. Extensive light-colored internal reflections noted in polished section.

Reflectance Data (Polished Section):

Wavelength	R
420	17.5
440	14.8
460	13.2
480	12.4
500	12.0
520	11.8
540	11.6
560	11.5
580	11.4
600	11.4
620	11.4
640	11.5
660	11.6
680	11.7
700	11.8

Hardness: 4.5 to 5

Specific Gravity: 6.10 (Meas.)
6.12 (Calc.)

Cleavage: {101} distinct
{112} interrupted
{001) indistinct

Habit: Xls octahedral [with {011} or {112} predominant] or tabular [with {001} predominant]; often diagonally striated and rough. In section, often as xenomorphic equant grains. Also massive, granular, columnar.

Twinning: On {110} common, as penetration twins with (110) or (001) as composition plane.

Color: Allochromatic. Colorless, white, grey, pale yellowish white to brownish, orange-yellow, greenish, purplish, reddish.

Diaphanity: Transparent to translucent

Luster: vitreous to adamantine

Fluorescence response: commonly, bright blue-white response under SW (wavelength = 254)

Streak: white

Chemistry: Calcium tungstate. Mo can substitute for W, creating a partial solid solution series between powellite ($CaMoO_4$) and scheelite. Ratios for Mo:W to 1:1.38 (24 weight percent) have been observed. With increased lattice substitution of Mo for W, specific gravity decreases (values as low as 5.9 have been observed). Also, with increased substitution of Mo for W, fluorescent response changes from blue white to white (at 0.35 to 1 atomic percent Mo) to yellow (>1 atomic percent Mo). Growth zones of differing Mo:W values are sometimes evident. Substitutions of REE's for Ca in lattice, and of Nb and Ta for W in lattice, have been observed. Trace amounts of Fe, Bi, F and Cl have been reported.

Mode of Occurrence: Widespread in contact metamorphic (skarn) deposits; in pegmatites and in hydrothermal veins. Secondary placer deposits have been observed.

Occurrences: Distribution extremely widespread. Economic deposits have been noted in the US (California, Nevada, Arizona, Colorado, New Mexico, Idaho, Montana, Utah, Connecticut); Canada (North West Territories); Mexico; Bolivia; Brazil; Peru; England; Spain; France; Austria; Germany; Czechoslovakia; Italy; Switzerland; Sardinia; USSR; Malaysia; Burma; Australia; Japan; Korea; Peoples Republic of China.

Common Mineral Associations: Associated with typical skarn assemblages; also wolframite, arsenopyrite, pyrrhotite, bismuthinite, native bismuth, galenobismuthinite, molybdenite.

GEOCHEMISTRY OF TUNGSTEN

by Daniel E. Russell
Harbormaster
City of Glen Cove

1. Isotopic Abundances

Tungsten occurs in nature as 5 isotopes, all of which are time-stable.

These isotopes and their abundances are:

W-180	0.1 %
W-182	26.4 %
W-183	14.4 %
W-184	30.6 %
W-186	28.4 %

2. Extraterrestrial Abundances

Cosmic Abundance:

Calculated values for the cosmic abundance of tungsten have been prepared using both the rate of nucleosynthesis and by interpolation from the abundances of Re and Hf, based on the Oddo-Harkins rule.

Values calculated from nucleosynthesis rates give an estimated abundance of between 0.105 and 0.20 atoms W per 10^6 atoms Si.

Values interpolated from the abundances of Hf and Re by Suess and Urey gave 0.49 atoms W per 10^6 atoms Si; this estimate appears high compare to observed lunar and meteoritical data.

Meteorites

Iron meteorites exhibit abundances of tungsten ranging from 0.07 to 5.0 ppm, with an average of 1.24 ppm. Variations in tungsten ranges were noted to be specifically dependent upon the genetic class. Irons by far exhibited the highest abundances of tungsten.

Achondrites exhibit abundances ranging from 0.035 to 0.12 ppm W, with an average of 0.067 ppm. As a group, achondrites display the lowest abundances of tungsten.

Chondrites exhibit abundances of tungsten in the range of 0.080 to 0.19 ppm, with an average of 0.14 ppm. tungsten concentration is dependent upon the percentage of metallic-phase inclusions in the sample, as tungsten tends to be enriched in this phase. Comparatively, sulphide and silicate phases in chondrites exhibit tungsten abundance ranges of 0.031 to 0.33 and 0.013 to 0.26 ppm respectively. On the whole, tungsten averages in chondrites compare favourably with calculated abundances based on nucleosynthesis.

Tektites exhibit tungsten abundances that range widely from 0.6 to 2.35 ppm. However, it should be noted that an extraterrestrial origin for tektites has not been proven.

Lunar Samples:

Samples of the lunar regolith exhibited tungsten ranges of 0.01 to 0.90 ppm.

Mare basalts ("Type A" rocks) exhibited tungsten ranges in the area of 0.07 to 0.43 ppm, although some samples of KREEP basalts ranged as high as 2.60 ppm W. Microgabbros ("Type B" rocks, or diabase) exhibited a range of 0.15 to 0.36 ppm W.

Breccias exhibited a range of abundances between 0.19 and 1.21 ppm W.

As in meteorites, tungsten was found to be strongly enriched in metallic phases, with up to 500 ppm noted.

3. Abundance in Igneous Rocks

Ultramafic rock ranges from 0.1 to 1.6 ppm W, with an average of 0.2 to 0.3 ppm. Harzburgites and dunites represent the low-end range members, while kimberlites and ultrabasites represent high-end members. Eclogites and peridotites closely approximate the median values.

Mafic rocks, including basalts, diabases and gabbros, exhibit W concentrations in the range of 0.2 to 14.5 ppm. Average values for basalts are 1.17 ppm W.

Intermediate rocks exhibit W ranges on the order of 1.4 to 3.3 ppm, with an average of 1.6 ppm for diorites, and 1.7 for granodiorite.

Felsic rocks exibit a wide range of W values, from 0.1 to 7,100 ppm (the later being a muscovite granite). W values in felsic rocks associated with ore bodies (greisens and muscovite granites) exhibit high levels of W, on the order of 568 to 574 ppm W average. "Average" granites unassociated with ore bodies show median W values of 1.3 to 3.7 ppm. Alkalic rocks, such as phonolites and nepheline-syenites, exhibit W levels in the range of 3.7 to 29.9 ppm, and 5.8 to 17.0 ppm, respectively.

The distribution of W within the rock-forming minerals of various petrographic types, especially granites, has been studied in detail. Quartz and K-feldspars tend to exhibit the least enrichment of W (0.2 to 4.8 ppm, and 0.4 to 4.0 ppm, respectively). Albites with as high as

20 ppm W are known. In some ultramafic petrographic types, a direct relationship between the anorthite content of plagioclase and W content has been found; with each 10 mol % increase in anorthite, W increases 1%.

Amphiboles display similar values for W content, with an average value of 2.7 ppm.

W inclusion by ferromagnesian micas is dependent upon melt alkalinity, and high-acid micas exhibit higher W averages. Increasing Al content also favours higher W levels in micas.

Accessory minerals are frequently highly enriched in W. Magnetites with up to 21 ppm W, ilmenites with up to 56 ppm W, and sphene with up to 78 ppm W, have all been noted in the past. Accessory mineral W contents also follow the general trend of the host petrographic type, with lower concentrations of W in accessory minerals in mafic rocks and higher W levels in felsic rocks.

Comparison of the oceanic crust with the continental crust indicates a general trend toward W enrichment in the continental provinces. The levels of W in oceanic crustal basalt and lunar mare basalts is similar, with values of 0.1 to 0.6 ppm W.

4. Abundance of Tungsten in Natural Waters

Because tungsten is easily affected by sorptional precipitation in the supergene zone, its concentration in natural waters seldom exceeds 1 ppb.

The concentration of tungsten in oceanic waters has been estimated at approx. $1.0 \times 10_{-4}$ ppb, with a residence time of 1,000 yrs.

Brines at Searles Lake, CA, have been reported to carry tungsten concentrations up to 70 ppm. Experiments by USBM have determined that tungsten is a recoverable resource from these brines despite their low concentrations. Other alkaline lakes in arid zones, especially where tungsten deposits are associated within the drainage basin, have also displayed high tungsten concentrations.

Surface thermal spring waters carrying up to 300 ppb W are not rare, especially at alkaline pH ranges. N_2 - bearing waters exhibit a greater affinity for carrying tungsten than do carbonate waters.

Surface water values in the range of 0.03 to 4.0 ppb have been noted. Substantially higher values (to 100 ppb) have been noted in association with acidic mine waters from tungsten mines. However, highly alkaline waters also transport increased tungsten concentrations.

The mobility of tungsten is greatly inhibited by several precipitation and co-precipitation processes in acid environments (pH 3-7). These include: precipitation of tungstic acid (as tungsten ochres); precipitation of supergene wolframite or scheelite; the sorptional precipitation of tungsten with other supergene minerals; and the evaporative concentration of tungsten.

In aqueous environment, wolframite undergoing decomposition is oxidized and the Fe and Mn hydrolyzed. In general, in an acidic medium, tungsten precipitates as tungstite (tungsten ochres, i.e. hydrous WO_3) and Fe and Mn go into solution. In alkaline media, the converse is true: Fe and Mn are precipitated as stable Fe and Mn oxides / hydroxides, and tungsten is taken into solution.

In aqueous environment, scheelite is slightly more sensitive to mineralogical associations. Decomposing sulphides (and the resultant acidic media accompanying such decomposition) yield tungsten ochres. Where tungsten is rendered mobile, it can be precipitated by Ca, Pb, Zn, Cu, Bi, Fe, Mn, etc., to yield supergene wolframite.

Sorption of tungsten by Fe and Mn hydroxides can be a significant mechanism for the removal of the element where the redox potential favours oxidative reactions. At near-neutral environments (pH 6-7) Fe hydroxides will precipitate 60 to 90% of tungsten at concentrations above 100 ppb. The effect of Mn hydroxides is similar, and pyrolusites with 80,000 ppm W are known. Evidence exists than in such an environment, 90 to 95% of the mobile tungsten would be stripped from solution in this fashion. The tungsten concentrations following sorption are frequently reduced to 10 to 30 ppb.

5. Biogeochemistry

Very little data is available regarding the biogeochemistry of tungsten.

Concentration of tungsten in plants at 2X to 18X background has been noted in mineralized areas. The biological absorption coefficient for tungsten showed maximum values in roots and branches of woody species and minimum values in leaves and needles. Typical absorption coefficients range from 0.02 to 6.0 for branches. Biological uptake is dependent upon which form the tungsten is in; secondary tungsten (ochre) minerals apparently provide the maximum potential for uptake, while scheelite and wolframite series mineral grains > 3mm provided the most minimal uptake.

Elevated levels of tungsten in coal ash, and in graphitic schists and phyllites (derived from organic shales, etc) has been suggested as historic evidence of uptake of tungsten by plants. However, adsorption of tungsten onto organic detritus, or chelation with organic radicals, in the original depositional environment is an equally valid interpretation of these observations.

THE EXTRACTIVE METALLURGY OF TUNGSTEN

by Daniel E. Russell
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ORE BENEFICIATION

W ore concentration is dependent on the ore characteristics as well as the mineral assemblages of the ore.

Ore comminution must be carefully controlled to prevent overgrinding of the mill feed, which causes excessive sliming and concomitant decrease in W recovery.

Gravity separation. froth flotation, magnetic separation, pneumatic separation, electrostatic separation, and roasting are used to provide selective removal of accessory minerals, including calc-silicates (garnets of grossular-andradite series; vesuvianite; diopside), quartz, molybdenite, arsenopyrite, pyrite, copper sulphides, and bismuthinite and native bismuth. Chemical concentration by digestion or leaching and reprecipitation as synthetic scheelite allows for recovery of residual W in gravity tails, low-grade ores, and slimes. It should be noted that some accessory minerals, such as tin minerals (cassiterite, stannite), bismuth species (native bismuth, bismuthinite) and molybdenum species (molybdenite) can represent economically recoverable resources once separated from the W concentrate.

The end product of such beneficiation techniques is a concentrate containing approximately 70% WO_3.

The primary technique for beneficiation of wolframite is usually gravity separation, in which the heavy minerals (wolframite, scheelite, cassiterite, etc) are separated from gangue minerals (quartz, feldspar, calcite, calc-silicates) based on differences in specific gravity. Gravity separation can be extremely efficient due to the high specific gravity of tungsten minerals (Sp.G. = 6 to 7) compared to gangue minerals.

While the primary technique for wolframite-based ores is gravity separation, froth flotation is the primary means of concentration in scheelite ores. Flotation is conducted in an alkaline environment (pH 9-10).

Frothers include pine oil, alcohols (butyl alcohol), terpenol, ethylene dichloride and cresol. Collectors are usually soaps and fatty acids, and include oleic acid, sodium oleate, sulfonated fatty acids and liquid soaps. When sulphides are present, xanthates (such as potassium amyl xanthate, sodium ethyl xanthate, butyl xanthate, or isopropyl xanthate) are used.

Typical depressors include sulphuric acid, hydrochloric acid, phsophoric acid, sodium carbonate, and/or tannin. The addition of Cu and/or Fe sulfates, copper nitrate, or copper ammonium hydroxide depresses the flotation of calcite, flourite, and apatite-series minerals. Starch, glue, or lactic acid may be used to depress mica. Short-chain organic acids (such as lactic acid or formic acid) depress apatite. Acid dichromates depress silica, and sodium silicate may be used to depress silicates. Manganese sulfate may be added to depress wolframite where applicable.

In the case of "tinny" (cassiterite bearing) W ores, the resultant W-Sn concentrate would then be treated by magnetic separation. In this case, the wolframite, which is slightly magnetic, can be separated from cassiterite, which is non-magnetic. In instances where normally-magnetic mineral grains are coated with non-magnetic oxides, a preliminary leach in acid (sulphuric or hydrochloric acid) is used.

Pyrite can be separated from the ore by roasting, which converts the mineral to Fe_3O_4, which can then be removed by magnetic separation techniques.

In a variation of magnetic separation, sulphide mineral particles are coated with a thin-film of finely comminuted magnetite dispersed in fuel oil in an acid medium. W minerals, and cassiterite, remain uncoated, allowing efficient magnetic separation.

In the case of cassiterite-bearing scheelite-based W ores, electrostatic separation would be required to separate the two minerals, as each species reacts to an electrostatic field in a different manner.

Chemical leaching as a beneficiation process includes treatment of ores containing apatite or calcite, which are dissolved by hydrochloric acid.

HYDROMETALLURGICAL TREATMENT

I. TREATMENT OF ORE CONCENTRATES

Numerous processes have been developed for the industrial-scale treatment of tungsten concentrates. The function of these processes is to extract the tungsten from the ores and convert the tungsten into one or more intermediary compounds amenable to further processing, while also removing significant impurities which would be detrimental to the final product.

These processes include:

Sodium Carbonate Fusion:

Wolframite concentrate is fused with a charge of sodium carbonate in the presence of sodium or ammonium nitrate to form sodium tungstate, according to the following reaction:

$$2FeWO_4 + 2Na_2CO_3 + 0.5\ O_2 \longrightarrow 2Na_2WO_4 + Fe_2O_3 + 2CO_2$$

$$2MnWO_4 + 3Na_2CO_3 + 0.5\ O_2 \longrightarrow 3Na_2WO_4 + Mn_3O_4 + 3CO_2$$

Potassium carbonate may be substituted for sodium carbonate, yielding potassium tungstate. Sodium chlorate may be substituted for part of the nitrate.

Sodium chloride, sodium fluoride, calcium chloride, or calcium fluoride may be added to the charge.

The resulting residue or "cake" is pulverized lixiviated with water and a saturated solution of sodium nitrate at between 80 and 100 degrees C, to dissolve the sodium tungstate. Impurities such as As, Mo, P, Si, SO_4, and CO_2, which have been converted into water-soluble Na salts, are also carried into solution with the W. The solid residue remaining after lixiviating contains Fe and Mn oxides and hydroxides, unreacted concentrate, etc. The sodium tungstate solution is decanted, hydrochloric acid added to the solution, and the temperature raised to 103 degrees centigrade to precipitate tungstic acid. Aluminum sulfate is sometimes added to inhibit or coagulate any colloidal tungstic acid formed. The process gives W recovery levels of 98 to 99 %. Waste liquids are recycled to recovery any residual W by the addition of calcium, as either calcium oxide or hydroxide, to precipitate synthetic scheelite.

Scheelite concentrates can also be treated with this process. Generally, silica is added to the fusion charge in order to convert calcium into an insoluble silicate. The reaction is:

$$CaWO_4 + Na_2CO_3 + SiO_2 \longrightarrow Na_2WO_4 + CaSiO_3 + CO_2$$

The resulting cake consists of calcium silicate and sodium tungstate and water soluble sodium salts of any impurities. The cake is likewise pulverized and lixiviated, and the resulting sodium tungstate solution processed as described above.

Sodium Carbonate Digestion:

Wolframite concentrates are digested in sodium carbonate solution under elevated pressure and temperature in a pressure vessel. Carbon dioxide is generated and must be continuously removed.

$$FeWO_4 + Na_2CO_3 + H_2O \longrightarrow Fe(OH)_2 + Na_2WO_4 + CO_2$$

Sodium bicarbonate may be substituted for sodium carbonate. Sodium chloride may be added to inhibit the formation of colloids.

The iron hydroxides are precipitated and the impure sodium tungstate decanted for further processing.

Scheelite concentrates may also be processed by this technique, also in pressure vessels at a temperature of approximately 180-200 degrees centigrade and a pressure of 15 atmospheres:

$$CaWO_4 + Na_2CO_3 \longrightarrow Na_2WO_4 + CaCO_3$$

The resulting slurry of insoluble calcium carbonate and soluble sodium tungstate is allowed to separate out, and the impure sodium tungstate decanted for further processing.

This process is greatly facilitated if silica is added to the scheelite concentrate slurry; insoluble calcium silicate is precipitated instead of calcium carbonate, and carbon dioxide evolved.

In a modification of this process, the impure sodium tungstate solution is then reacted with calcium hydroxide to remove any excess sodium carbonate (which is precipitated as calcium carbonate) and the resulting solution is treated with a barium salt and boiled. A water-soluble barium tungstate is formed, as well as insoluble barium salts of many impurities. The barium tungstate is then treated with hydrochloric acid to precipitate tungstic acid.

<u>Sodium Hydroxide Fusion</u>:

A tungsten concentrate is fused with pure sodium nitrate to yield sodium tungstate according to the reactions:

$$FeWO_4 + 2NaOH \longrightarrow Na_2WO_4 + Fe(OH)_2$$

$$MnWO_4 + 2NaOH \longrightarrow Na_2WO_4 + Mn(OH)_2$$

The resulting cake is pulverized and lixiviated and the sodium tungstate solution decanted from the residue of manganese or iron hydroxides.

In a variation of this process, potassium hydroxide is fused with scheelite concentrate and calcium oxide. The calcium reacts with any Si to form insoluble calcium silicate.

<u>Sodium Hydroxide Digestion</u>:

The wolframite concentrate is digested in commercial concentrate sodium hydroxide solution at a temperature of between 100 and 110 degrees C, the following reaction occurs:

$$FeWO_4 + 2NaOH \longrightarrow Na_2WO_4 + Fe(OH)_2$$

$$MnWO_4 + 2NaOH \longrightarrow Na_2WO_4 + Mn(OH)_2$$

W recovery is between 98 and 99 %.

In one variant of this process, wolframite concentrates are digested in sodium hydroxide with calcium hydroxide at 180 degrees centigrade at 6 atmospheres in a pressure vessel. Calcium forms insoluble salts with any Si present.

In another variation, the W concentrate (either wolframite or scheelite) is digested in sodium at elevated temperature and pressure (ca. 60 psi) to yield sodium tungstate. Impurities, including P, Si, As, Mo, etc., also form soluble salts; these are precipitated by the addition of calcium hydroxide. The purified sodium tungstate is then precipitated as tungstic acid by the addition of hydrochloric acid.

Acid Digestion:

Scheelite concentrate is digested in hydrochloric acid at 80 degrees centigrade directly to yield a solution of calcium chloride and a precipitate of tungstic acid:

$$CaWO_4 + 2HCl \longrightarrow H_2WO_4 + CaCl_2$$

A dilute solution of nitric acid may be added to the hydrochloric acid to inhibit reduction of tungstic acid to tungsten oxides.

The residual tungstic acid (which may contain up to 3 % impurities) may be directly converted to APT, and the impurities removed by fractional xllization.

In an allied process, the W concentrate (either scheelite or wolframite) is digested in hydrochloric acid with either potassium chlorate or sodium chlorate at elevated pressure at 90 degrees centigrade. Insoluble tungstic acid and silicates are formed; other impurities form water-soluble salts which are carried into solution. The residue is then treated with ammonium hydroxide, forming ammonium tungstate solution and leaving the silicates as a residue.

In a variation of this process, the concentrate is digested in sulfuric acid in a pressure vessel at elevated pressure and temperature (180 degrees centigrade for wolframite, 150 degrees for scheelite), leaving a residue of tungstic acid. Nitric acid may be added to oxidized any impurities.

Nitrate Fusion:

A fusion charge, consisting either of pure sodium nitrate or ammonium nitrate, or a mixture of charcoal, sodium silicate, and sodium nitrate or ammonium nitrate is mixed with the concentrate and ignited.

The resulting cake is pulverized and lixiviated in water. The sodium or ammonium tungstate is dissolve, and insoluble impurities remain behind as residue.

Ammonia Digestion:

The concentrate is digested in ammonium hydroxide solution at elevated temperature and pressure in a pressure vessel, forming ammonium tungstate.

APT may be directly formed from the resulting solution, either by pH adjustment or xllization by evaporation. Impurities may also form water-soluble salts, either of ammonia or hydroxide, as part of the reaction. Control of these impurities is most easily accomplished by fractional xllization.

OTHER PROCESSES:

The following processes have been developed but have found only limited commercial application:

Bisulphate Fusion:

Concentrate is first fused with pure sodium bisulphate at 300 degrees centigrade. A second fusion charge of sodium bisulphate, calcium oxide or calcium chloride, and sodium chloride is added to the fused mass, and the temperature elevated to 800 degrees centigrade.

The resulting cake is pulverized and lixiviated in water. Sodium tungstate is dissolved into solution, and the impurities are left behind as insoluble calcium salts.

In a variation of this process, potassium bisulphate is used in place of sodium bisulphate in the fusion charge. After lixiviation, a portion of the impurities are carried into solution as soluble potassium salts; insoluble potassium acid tungstate, potassium silicates and undigested silica, tin compounds, and insoluble sulfates are left as a residue.

The residue is dried and then digested in an ammonium carbonate solution, dissolving the potassium acid tungstate. APT may be directly formed from the resulting solution, either by direct evaporation or pH adjustment.

Fusion with Calcium Carbonate and Sodium Chloride:

A fusion charge of calcium carbonate (ground marble) or calcium chloride, and sodium chloride is mixed with the concentrate and fused at 700 degrees centigrade.

The resulting cake is pulverized and lixiviated. Recovery of 95 % W is possible.

Fusion with Neutral Salts:

A variety of "neutral" salts may be used as a fusion charge. These include: a) sodium chloride and calcium carbonate; b) magnesium chloride; c) sodium sulfate and coke with sodium carbonate; d) sodium chloride and sodium nitrate or potassium nitrate or ammonium nitrate; e) calcium chloride, sodium chloride or potassium chlorate f) potassium fluoride or sodium fluoride or calcium fluoride.

These processes are substantially the same in general approach as the other fusion processes described above, have met with little commercial application, and therefore will not be subject to extensive discussion.

Chloride Process:

The concentrate is treated with chlorine, anhydrous hydrogen chloride, carbon tetrachloride, or sulfur chloride to form tungsten chlorides which can be volatized at ca. 300 degrees centigrade. The tungsten chlorides are then collected (either by condensation or by dissolution).

Electrolytic Process:

The concentrate is mixed with either an acid or alkaline electrolyte. The tungsten compounds are insoluble in the electrolyte while the impurities readily go into solution.

Typically, the concentrate is mixed with sulphuric acid, and electricity applied to the resulting slurry. Fe, Mn, Sn, Ca, and Na go into solution; tungstic acid remains as an insoluble residue.

II. TREATMENT OF INTERMEDIARIES:

Numerous tungsten compounds can be formed from the treatment of ore concentrates; however, the most common in industrial processes are tungstic acid, sodium tungstate, and ammonium tungstate or paratungstate.

These intermediate compounds may be additionally treated by hydrometallurgical processes to further purify them, may be formed into other intermediaries depending upon process requirements, or may be directly transferred for pyrometallurgical processing into tungsten powder.

Processing of Sodium Tungstate:

Sodium tungstate solutions from any of the concentrate processing techniques described above must be treated to remove impurities before conversion into any of the primary intermediaries of tungsten used in industrial processes.

The impurities normally found in sodium tungstate solutions include Si, P, Mo, As, and SO_4, all of which are capable of forming heteropoly Na tungstates in solution (and therefore capable of decreasing the yield of W).

Silica is removed from alkaline solutions by adjusting the pH to between 8 and 9 with hydrochloric acid, and boiling. Si is precipitated as a colloid. Ammonium chloride may be used in place of hydrochloric acid.

$$Na_2SiO_3 + H_2O \longrightarrow H_2SiO_3 + 2NaOH$$

Phosphorus and arsenic are remove by precipitation from a cold solution by magnesium chloride (or other alkaline earth metal) with an excess of ammonium hydroxide, as magnesium ammonium phosphate and magnesium ammonium arsenate, respectively.

$$Na_2HPO_4 + MgCl_2 \longrightarrow Mg(NH_4)PO_4 + 2NaCl + H_2O$$

$$Na_2HAsO_4 + MgCl_2 \longrightarrow Mg(NH_4)AsO_4 + 2NaCl + H_2O$$

Molybdenum is removed by the addition of sodium sulfide at a pH of 2.5 to 3.0, and heating the solution. It is precipitated as molybdenum trisulphide.

$$Na_2MoO_4 + 4Na_2S + 4H_2O \longrightarrow Na_2MoS_4 + 8NaOH$$

$$Na_2MoS_4 + 2HCl \longrightarrow MoS_3 + 2NaCl + H_2O$$

The residual solution consists of sodium metatungstates; sodium hydroxide is then added and the solution is boiled to convert the tungsten into sodium tungstate. It is then ready for conversion to W intermediaries, specifically synthetic scheelite, APT, or tungstic acid, or direct xllization as sodium tungstate.

a. Conversion to Tungstic Acid:

The sodium tungstate solution is heated to 90 degrees centigrade and added to a boiling solution of 25 % hydrochloric acid, to yield tungstic acid:

$$Na_2WO_4 + 2HCl \longrightarrow H_2WO_4 + 2NaCl$$

The residue is washed to remove the sodium chloride. Hydrochloric acid, nitric acid or ammonium chloride is added to the final wash to prevent formation of colloidal tungstic acid.

A recovery of 98 to 99 % W is usual. The resulting tungstic acid may be converted directly into APT or tungsten trioxide.

b. Conversion to Synthetic Scheelite:

Calcium chloride is added to a boiling solution of sodium tungstate, to which a small amount of an alkali hydroxide has been added:

$$Na_2WO_4 + CaCl_2 \longrightarrow CaWO_4 + 2NaCl$$

Calcium hydroxide may be used in place of calcium chloride.

Other low-solubility calcium salts (such as sulphate, carbonate, silicate, molybdate and phosphate) are coprecipitated with the synthetic scheelite. Calcium sulphate may be removed by a hot water wash; the other calcium salts must be removed using other techniques.

W recovery is approx. 99 %.

The resulting synthetic scheelite is decomposed by a solution of hydrochloric acid at 60 degrees centigrade to form tungstic acid:

$$CaWO_4 + 2HCl \longrightarrow H_2WO_4 + CaCl_2$$

Any residual tungsten in waste solutions can be recovered by precipitation as calcium tungstate by the addition of calcium (usually as oxide, hydroxide or chloride).

Processing of Tungstic Acid

Tungstic acid derived from processing of concentrates can contain up to 3 % impurities, consisting predominately of Na, Ca, Si, Mo, Fe, Mn, Al, P, As, and undigested ore (wolframite or scheelite).

The tungstic acid is dried at a temperature not exceeding 170 degrees centigrade (above this temperature, it converts to a less-soluble form), then suspended in water at 80 degrees centigrade to form a slurry. The slurry is then reacted with 25 % ammonium hydroxide, forming water soluble ammonium tungstate. Impurities remain as insoluble oxides, hydroxides, and calcium salts.

After settling and filtration, the tungsten may either be precipitated as purified tungstic acid (by the addition of hydrochloric acid), or evaporated to form APT.

Processing of Ammonium Paratungstate

Ammonium paratungstate (APT) is one of the principal intermediaries of tungsten, and is also one of the primary commodity forms of tungsten (the other being tungsten metal powder).

APT has the general formula of $5(NH_4)_2O.12WO_3.nH_2O$, where n equals either 5, 7 or 11 molecules of water. The water is only in part zeolitic. Three polymorphs of APT are known; the first two are triclinic, with one form (pentahydrate) xllizing from solution above 50 degrees centigrade, and the other (a septahydrate) crystallizing at temperatures above 50 degrees; the controlling factor over which polymorph is formed appears to be rate of xllization. Both triclinic forms exhibit tabular xls of rhombic form. The last polymorph is triclinic and contains 11 water molecules, and xllizes from low-temperature solutions (below 50 degrees centigrade) as acicular xls.

The tungstic acid used in preparation of APT is first dried at a temperature not exceeding 170 degrees centigrade. Above this temperature, the solubility of the tungstic acid rapidly decreases owing to dehydration.

Ammonium paratungstate is prepared by dissolving tungstic acid in ammonium hydroxide to form ammonium tungstate:

$$H_2WO_4 + NH_4OH \longrightarrow (NH_4)_2WO_4 + H_2O$$

Silica and calcium oxides/hydroxides form an insoluble residue; other impurities go into solution with the tungstate.

APT may then be prepared from the solution of ammonium tungstate either by direct xllization by evaporation or by chemical neutralization of the supernatant alkaline solution.

In direct xllization by evaporation, excess ammonia is liberated which may be reclaimed:

$$12(NH_4)_2WO_4 \longrightarrow 5(NH_4)_2O.12WO_3.nH_2O + 7NH_3 + 14H_2O$$

Ammonium paratungstate xllizes from the solution. Impurities can be directly controlled through fractional xllization. Typically, a "raw" tungstic acid containing 3.2 % impurities can be converted in APT with only 0.04 % impurities by careful control of xllization. While only 80 % of the W is precipitated directly as APT, the residue liquid is recycled and little W is directly lost through this process.

APT is also formed when HCl is used to neutralize an alkaline ammonium tungstate solution, precipitating as acicular needles. The optimal pH for APT formation is 7.35 :

$$12(NH_4)_2WO_4 + 4HCl \longrightarrow 5(NH_4)_2O.12WO_3.nH_2O + 14NH_4Cl$$

This processes provides W recovery to 90 %. After APT precipitation, the residual solution is recycled and remaining W precipitated as either synthetic scheelite or other intermediary.

APT may be converted to tungstic acid for further purification by treatment with concentrated hydrochloric acid heated to boiling:

$$5(NH_4)_2O.12WO_3.nH_2O + 10HCl \longrightarrow 12H_2WO_4 + 10NH_4Cl + 4H_2O$$

APT may be converted to sodium tungstate by treatment with sodium hydroxide, or it may be thermally decomposed to form WO_3, or may be processed directly to tungsten metal powder by hydrogen reduction.

NOTES ON ORGANIC SOLVENT EXTRACTION PROCESS

There is some preliminary evidence that an organic extraction process was in use at Li Tungsten as a component of the hydrometallurgical processing of tungsten.

There is a paucity of data regarding the details of this process. It appears that one component of the solvent extraction process was a catalyst, supplied by Parkans Minerals, Texas, as alundum pellets doped with cobalt, nickel, and carbon. No data on the chemistry or formulation of the organic phase is available.

An organic solvent extract process in operation at an unrelated tungsten processing facility involves the use of "aliphatic base amine solvents with an alcohol modifier", more specifically, sinclair odorless solvent containing dilauryl amine (50 g/l) and trimethyl nononol (13-15 %). This solution is apparently emulsified with APT solutions (?) to produce tungstic oxide, tungstic acid, or another intermediary (?) .

Details regarding organic solvent extraction of tungsten in general are sketchy; most schemes are proprietary and are therefore confidential.

The exact nature of the organic solvent extraction process used at Li Tungsten must be studied in greater detail.

PYROMETALLURGICAL TREATMENT

The intermediary, in the form of highly purified tungstic acid or APT, is then ready for processing into tungsten metal powder.

Formation of Tungsten Trioxide:

The first phase of tungsten metal production is production of tungsten trioxide.

Tungstic acid is thermally decomposed in a dry hydrogen atmosphere to directly form tungsten trioxide:

$$H_2WO_4 \longrightarrow WO_3 + H_2O$$

APT may also be thermally decomposed in a dry hydrogen atmosphere to tungsten trioxide:

$$5(NH_4)_2O.12WO_3.nH_2O \longrightarrow 12WO_3 + 10NH_3 + xH_2O$$

The temperature used to decompose the intermediaries is approximately 750 to 850 degrees centigrade.

Reduction to Metal Powder

Because of the high melting point of tungsten (3395 degrees centigrade) powder metallurgy is traditionally used as the most economical method of metal preparation. However, application of vacuum melting techniques (arc melting and electron beam melting) have played an increasing role in industrial manufacture since the 1960's.

Two reduction methods have widespread application in the reduction of tungsten metal powder. These are hydrogen reduction and carbon reduction. Hydrogen reduction is used where tungsten powder of high purity is required, especially tungsten intended for ductile tungsten manufacture. Carbon reduction may be applied when contamination of the resulting tungsten powder by carbides is of no major consequence.

a. Reduction by Hydrogen:

Tungsten trioxide is reduced in a hydrogen atmosphere to form pure tungsten metal, according to the gross reaction

$$WO_3 \longrightarrow W + 3H_2O$$

However, in reality the reduction of tungsten trioxide occurs in four distinct phases, producing oxides of intermediate composition:

$$10WO_3 + H_2 \longrightarrow W_{10}O_{29} + H_2O$$

$$2W_{10}O_{29} + 3H_2 \longrightarrow 5W_4O_{11} + 4H_2O$$

$$W_4O_{11} + 3H_2 \longrightarrow 4WO_2 + 3H_2O$$

$$WO_2 + 2H_2 \longrightarrow W + 2H_2O$$

Tungsten trioxide (WO_3) is a yellow powder. The intermediate oxide $W_{10}O_{29}$ (also written $WO_{2.9}$) is blue (frequently referred to in process technology as "blue oxide"). The intermediate oxide W_4O_{11} (also written $WO_{2.75}$) is violet/purple. Tungsten dioxide (WO_2) is brown.

The reduction process traditionally requires a two-phase treatment in a dry hydrogen-atmosphere furnace. The first phase requires heating at 500 to 700 degrees centigrade, converting tungsten trioxide to tungsten dioxide. The second phase, involving heating the dioxide to 780 to 1100 degrees, produces metallic tungsten.

Throughout the process, water vapor must be continuously removed.

Note on Hydrogen Production:

Since the hydrogen reduction process in use at Li Tungsten required considerable amounts of hydrogen gas, the production of hydrogen at the facility will be examined.

Traditionally, hydrogen is produced from the electrolytic decomposition of water, to which a little sodium hydroxide has been added to increase conductivity. Any residual O_2 is removed by reaction with a catalyst at elevated temperature (ca. 600 degrees centigrade) to form water vapor, which is then removed by a scrubber column packed with a suitable desiccant. Typical desiccants are silica gel, calcium chloride, or sodium hydroxide. The dry H_2 is then supplied to the furnaces. After use, the hydrogen gas can be recycled through the scrubber column to remove the water vapor generated by the reduction of the tungsten oxide.

b. Reduction by Carbon:

Tungstic acid, tungsten trioxide, etc, may be reduced by carbon (lampblack) in an oxygen-free atmosphere. The metallic tungsten produced is contaminated by carbides and by any metals which occur as impurities in the lampblack.

In general, the reaction is:

$$WO_3 + 3C \longrightarrow W + 3CO$$

However, as with hydrogen reduction, several intermediate stages occur in the reduction process:

$$4WO_3 + CO \longrightarrow W_4O_{11} + CO_2$$

$$W_4O_{11} + 3CO \longrightarrow 4WO_2 + 3CO_2$$

$$WO_2 + 2CO \longrightarrow W + 2CO_2$$

The reduction temperature is about 1500 degrees centigrade.

<u>c. Other Reduction Techniques</u>

Several other reduction techniques exist which have not gained widespread commercial application. These include variations of the Goldschmidt (thermite) process, in which the tungsten trioxide is mixed with powdered aluminum metal and a peroxide, and the resulting mix ignited. Electrolytic reduction, involving aqueous or fused-salt bath electrolytes, has also been applied.

<u>Consolidation of Metal Powders</u>

The pure tungsten metal powder produced by hydrogen reduction may be formed into solid metal by hydraulic pressure followed by sintering. The final form may either be a billet or, where required, the powder may be formed directly into the shape of the ultimate intended product.

<u>a. Hydraulic Pressing</u>:

The metal powder is mixed with a binder, which also acts as a mold lubricant, such as paraffin dissolved in benzene, gasoline, or carbon tetrachloride, or glycerin in water, placed into a steel mold, and subjected to pressures of approx. 20 tons per square inch.

<u>b. Sintering</u>:

The resulting friable mass is then sintered at high temperature.

Traditionally, a "presintering" is required to consolidate the "proto-billet" into a form which may be handled without falling apart. This is performed in a hydrogen atmosphere at a temperature of 1150 to 1300 degrees centigrade. The presintering burns off the organic binder, as well as reduces any thin-film oxides coating the tungsten xls.

This is followed by high temperature sintering. The billet is placed between electrical contacts over a water-cooled mercury well, and a low voltage, high amperage electric current passed through the billet. The resistivity of the tungsten generates heat (normally 85 to 95 % of the temperature required to fuse the tungsten). The process is conducted in a hydrogen atmosphere. The effect of the process is to cause rexllization of the tungsten.

c. Swaging:

The mechanical working properties of the tungsten metal are dependent upon the xl structure of the billet following the final sintering stage. Fine-grained metal is more brittle, and more difficult to work mechanically, than coarse-grained tungsten (which is the opposite of most metals).

Swaging (or forging) is performed at high temperatures (starting at 1350 degrees centigrade) in a hydrogen atmosphere. The billet is subjected to rapid strokes (about 10,000 per minute) in a mechanical swager. As the size of the billet is reduced, the temperature of swaging is also reduced.

The metal must be annealed frequently during swaging. The metal is protected by a coating of graphite.

The effect of the swaging process is to remove interstices between xl grains.

d. Wire Production:

Tungsten wire is produced by drawing the swaged billet through decreasing-diameter dies (usually tungsten carbide, boron carbide, or diamond) at high temperature. The wire must be annealed frequently.

e. Cleaning:

The resulting metal product is cleaned by either a final annealing in a hydrogen atmosphere (for wire) which removes the protective graphite coating; by electrolytic treatment in a solution of sodium hydroxide; or by dipping in a bath of fused nitrite.

Metal Dopants:

The production of ductile tungsten wire for filaments is dependant upon the presence of a metal dopant (usually Th in the amount of 0.5 to 2.0 %) added to the tungsten metal. This process is known as the Coolidge process.

At elevated temperatures, tungsten exhibits a tendency to rexllize with a coarser grain structure. In thin wires, the enlarged grain boundaries will cause mechanical failure of the wire. This rexllization is known as "offsetting". Th increases the temperature at which offsetting occurs to above 2500 degrees centigrade.

The addition of second-metal dopants to tungsten (such as thorium for tungsten intended for wire production) may occur at a number of stages in processing. The dopant may be coprecipitated with tungstic acid or APT, may be mixed with the tungstic acid or APT immediately prior to thermal decomposition to tungsten trioxide, may be mixed with the tungsten trioxide, or may be added directly to the tungsten metal powder.

Production of Tungsten Carbide

Because of the importance of tungsten carbide to industry, innumerable patented processes exist for the production of tungsten carbide. A considerable number of variations exist in the metals used in the sintering of tungsten carbide; additional metals include, but are not limited to: Mo, Fe, Mn, Ti, Ni, Cr, Co, Th, U, Ta, Nb, Zr, B, Si, Ce, Pt-group, V, Hf, Sn, Al, Zn, Pb, Sb, Mg, Ag, and Au.

The variants of carbide production are well beyond the scope of this paper, and only a generalized scheme will be presented.

Tungsten carbide exists in two forms: tungsten carbide (WC) and ditungsten carbide (W_2C). Tungsten carbide is formed by mixing carbon (lampblack) and tungsten metal powder in an oxygen free, carburized atmosphere at 1500 degrees centigrade:

$$W + C \longrightarrow WC$$

Ditungsten carbide is formed by mixing carbon (lampblack) and tungsten metal powder in an oxygen-free, carbon-free atmosphere at between 1000 and 1600 degrees centigrade:

$$2W + C \longrightarrow W_2C$$

Tungsten trioxide may be converted directly to tungsten carbide by reduction with carbon, or by carburizing tungsten powder with carbon monoxide, methane, or other hydrocarbons.

Two general schemes for industrial manufacture of tungsten carbide items are in use:

a. Cold Pressing:

Tungsten carbide of approx. 2 micron diameter is mixed with metallic cobalt (or other metal) powder. A binder, such as paraffin dissolved in carbon tetrachloride, benzene, or gasoline is added and the mass pressed in a steel mold at approximately 30 tons per square inch.

The resulting mass is then presintered at between 800 and 100 degrees centigrade, followed by sintering at 1400 to 1500 degrees in a hydrogen atmosphere.

b. Hot Pressing:

Tungsten carbide of approx. 2 micron diameter is mixed with metallic cobalt (or other metal) powder. A binder, such as paraffin dissolved in carbon tetrachloride, benzene, or gasoline is added and the mass pressed in a carbon mold at approximately 1000 tons per square inch. Electricity at low voltage, high amperage is run through the carbon mold, generating heat which effectively sinters the carbide mass.

Consolidation of carbide/metal mixes may also be accomplished in vacuum furnaces.

In these processes, it is possible to press the carbide/metal mass into the general form of the ultimate industrial item to be produced prior to sintering.

Several polymetallic carbides have been created, such as Kennametal ($WTiC_2$). This process involves the combining of titanium and tungsten with carbon in a bath of molten nickel in a graphite crucible.

BIOGRAPHICAL ABSTRACT

Li, Kuo Ching

Born 24 Sept 1892, Changsa, China
Died 07 Mar. 1961, Glen Cove, NY

Son of Chan and Queen Tan Li.

Education: Hunan Technical Inst., Changsha, China (ME, 1909). Royal School of Mines, London, England (ARSM, 1915). Clark University (D.Sc., hon., 1958)

Married first: Po-ku Loo (1911)
Issue: Lien Ming (Mrs. K.C. Koo)
Lien Fung (Mrs. R.H. Ho)
Lien Yen <adopted>

Married second: Grace E. Fung (1917)
Issue: Marjorie (Mrs. Alfred Wu)
Mildred (Mrs. William Distin)
Madeline (Mrs. Edward Leong Way)
Marie (Mrs. Gordon Chun)
Kuo Ching Jr
John Choi <adopted>

Relocated to US 1916; naturalized 1948.

Professional Affiliations:

1909-12	Sec., Hunan Mining Board
1912-15	Dep. Commis., Mining Board to Study Mining & Geological Methods in Europe and US.
1915-16	Pres., Kiang Wah Govt Tin Mines
	Pres., Hsiao Ky San Mines
	Co-Dir., Hunan Mining Board
	VPres./NY Mgr., Wah Chang Smelting & Refining Ltd
	Pres./Mng Dir., Wah Chang Trading Corp
	NY Rep, Chinese Ministry of Finance
	NY Rep, Chinese Ministry of Agricultural & Commerce
1928	Gov., NYC Commodity Exchange
1936-48	Dir, Central Bank of China
1936	Pres., Wah Chang Corp
1940	Chm Bd., Wah Chang Smelting & Refining Co of Am
	Chm., Wah Chang Mining Corp
	Dir, Howe Sound Co
	Trustee, China Inst of Amer
	Member, China Foundation

1943-44	VPres., China Society
	Advisor, Chinese Embassy, Washington DC

Honours:

1920	Cheaho (Peking)
1937	Order of Merit (Nanking)
1945	Order of Jade (Chungking)
1956	Order of Southern Cross (Brazil)
1957	Peace and Friendship Medal
	Chinese Instit. Engineers Award
	Chemical Engineering Achievement Award
1960	Order of Crown (Thailand)

Endowments:

1944	Li Foundation (see appended)
1948	Li Medal, Columbia University

Home: 22 Thompson Park, Glen Cove

Office: 233 Broadway, NYC

LI FOUNDATION

66 Herb Hill Road
Glen Cove NY 11542

Employer ID No: 136098783

Established 1944.
Dispersal of student aid scholarships to Chinese students, primarily in China.

Assets:	$4,446,143.00	(as of 31 Dec 1984)
Gifts Rec'd:	26,574.00	
Expenditures:	365,004.00	

56 grants, totalling $271,340.00 bestowed in 1984. Minimum grant was $110; maximum was $16,150

Officers: E. Leong Way, Pres
Madeline 1. Way, Treas

URANIUM AND THORIUM LEVELS

IN TUNGSTEN ORE PROCESSING RESIDUES

by D. E. Russell
Harbormaster,
City of Glen Cove

The discovery of significant levels of Th and U in the 34 million pounds of tungsten ore processing residue found abandoned at the Li Tungsten site raised considerable interest in identifying the source of the tungsten ores processed at this facility as well as the occurrence of U and Th in tungsten ores in general.

During its operational life, the facility imported tungsten concentrates from a diverse list of localities. In addition to concentrates derived from its California and Nevada mines, as well as concentrates obtained from Canada, Mexico, South America, Africa, Europe, Southeast Asia, and Asia. It is believed that a significant percentage of feedstock was obtained from Communist China.

Selected analyses of several tungsten residues, including data on residual levels of U and Th, from wolframite, scheelite, and slimes, are appended. Data on EP Tox. Metals is also provided; no significant metals of this class were detected in any residue analysis.

Additional analyses of scheelite residues are provided in Table I. Gross alpha activity, gross beta activity, and concentrations of Ra-226 and Ra-228 are given in addition to quantitative analyses of Th and U.

It will be noted that the ratios of thorium to uranium appear to be highly variable, and that the Chinese ores characteristically exhibit elevated levels of both metals.

At present, representative samples of world-wide tungsten ores are being sought for a comprehensive survey of U and Th levels.

It is hoped that the host phase (or phases) can be identified and that the mechanism for U and Th enrichment can be studied in greater detail so that in the future problematic ores can be more readily identified.

SOURCE: Zhejiang

Concentrate Type: High Grade Wolframite

Initial Concentration WO_3 (%): 66.5

Residue Analysis:

WO_3 (%) : 48.2
% Extraction : 51.5

U (ppm): 458
Th (ppm): 139

Ratio Th:U = 0.303

Ra-226 (picocuries/gram): 190

EP Tox Metals:

Ag = < 0.1

As = 0.13

Ba = 2.9

Cd = 0.079

Cr = 0.09

Hg = < 0.1

Pb = 0.38

Se = < 0.1

SOURCE: Xihuashan

Concentrate Type: High Grade Wolframite

Initial Concentration WO_3 (%): 66.0

Residue Analysis:

WO_3 (%) : 18.2
% Extraction : 85

U (ppm): 534
Th (ppm): 170

Ratio Th:U = 0.318

Ra-226 (picocuries/gram): 180

EP Tox Metals:

Ag = < 0.1

As = 0.17

Ba = 0.04

Cd = 0.17

Cr = 0.19

Hg = < 0.1

Pb = < 0.12

Se = < 0.1

SOURCE: Pangushan

Concentrate Type: High Grade Wolframite

Initial Concentration WO_3 (%): 69.2

Residue Analysis:

WO_3 (%) : 1.79
% Extraction : 98.9

U (ppm): 128
Th (ppm): 29

Ratio Th:U = 0.226

Ra-226 (picocuries/gram): 53

EP Tox Metals:

Ag = < 0.1

As = 0.5

Ba = 0.87

Cd = 0.13

Cr = 0.02

Hg = < 0.1

Pb = 3.88

Se = < 0.1

SOURCE: Pangushan

Concentrate Type: Low Grade Slime (Wolframite/Scheelite)

Initial Concentration WO_3 (%): 25.5

Residue Analysis:

WO_3 (%) : 2.22
% Extraction : 93.5

U (ppm): 42
Th (ppm): 57

Ratio Th:U = 1.357

Ra-226 (picocuries/gram): 47

EP Tox Metals:

Ag = < 0.1

As = 0.04

Ba = 31.4

Cd = 0.095

Cr = 0.24

Hg = < 0.1

Pb = 0.27

Se = < 0.1

SOURCE: Dajishan

Concentrate Type: High Grade Wolframite

Initial Concentration WO_3 (%): 70.4

Residue Analysis:

WO_3 (%) : 1.14
% Extraction : 99.3

U (ppm): 94
Th (ppm): 8

Ratio Th:U = 0.085

Ra-226 (picocuries/gram): 26

EP Tox Metals:

Ag	=	< 0.1
As	=	0.10
Ba	=	0.09
Cd	=	0.17
Cr	=	0.19
Hg	=	< 0.1
Pb	=	< 0.12
Se	=	< 0.1

SOURCE: Yu Chin

Concentrate Type: High Grade Wolframite

Initial Concentration WO_3 (%): 67.3

Residue Analysis:

WO_3 (%) : 2.7
% Extraction : 98.2

U (ppm): 229
Th (ppm): 260

Ratio Th:U = 1.135

Ra-226 (picocuries/gram): 75

EP Tox Metals:

Ag = < 0.1

As = 0.09

Ba = 2.9

Cd = 0.17

Cr = 0.26

Hg = < 0.1

Pb = 9.1

Se = < 0.1

SOURCE: Guimeishan

Concentrate Type: Low Grade Slime (Wolframite/Scheelite)

Initial Concentration WO_3 (%): 25.7

Residue Analysis:

WO_3 (%) : 1.82
% Extraction : 94.6

U (ppm): 12
Th (ppm): 48

Ratio Th:U = 4.0

Ra-226 (picocuries/gram): 4.4

EP Tox Metals:

Ag = < 0.1

As = 0.4

Ba = 0.91

Cd = 0.71

Cr = 0.10

Hg = < 0.1

Pb = 0.18

Se = < 0.1

SOURCE: Dajishan

Concentrate Type: Low Grade Slime (Wolframite/Scheelite)

Initial Concentration WO_3 (%): 27.2

Residue Analysis:

WO_3 (%) : 1.73
% Extraction : 95.2

U (ppm): 70
Th (ppm): 10

Ratio Th:U = 0.143

Ra-226 (picocuries/gram): 20

EP Tox Metals:

Ag = < 0.1

As = 4.3

Ba = 0.36

Cd = 0.36

Cr = 0.31

Hg = < 0.1

Pb = 0.1

Se = < 0.1

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SOURCE: Australia

Concentrate Type: Wolframite

Initial Concentration WO_3 (%) : 75.7

Residue Analysis:

WO_3 (%) : 2.76
% Extraction : 98.5

U (ppm): 16
Th (ppm): 1

Ratio Th:U = 0.062

Ra-226 (picocuries/gram): 8

EP Tox Metals:

Ag = < 0.1

As = 0.06

Ba = 0.02

Cd = 0.02

Cr = 0.18

Hg = < 0.1

Pb = < 0.12

Se = < 0.1

SOURCE: Australia

Concentrate Type: Wolframite

Initial Concentration WO_3 (%): 67.3

Residue Analysis:

WO_3 (%) : 1.75
% Extraction : 98.7

U (ppm): 8
Th (ppm): 5

Ratio Th:U = 0.625

Ra-226 (picocuries/gram): 4

EP Tox Metals:

Ag = < 0.1

As = 3.9

Ba = 0.09

Cd = 0.01

Cr = 0.23

Hg = < 0.1

Pb = < 0.12

Se = < 0.1

SOURCE: Australia

Concentrate Type: Wolframite

Initial Concentration WO_3 (%): 39.3

Residue Analysis:

WO_3 (%) : 0.62
% Extraction : 99.0

U (ppm): 8
Th (ppm): 10

Ratio Th:U = 1.25

Ra-226 (picocuries/gram): 4

EP Tox Metals:

Ag	=	< 0.1
As	=	0.12
Ba	=	0.11
Cd	=	0.01
Cr	=	0.24
Hg	=	< 0.1
Pb	=	< 0.12
Se	=	< 0.1

SOURCE: Thailand

Concentrate Type: Wolframite

Initial Concentration WO_3 (%): 68.6

Residue Analysis:

WO_3 (%) : 0.92
% Extraction : 99.5

U (ppm): 60
Th (ppm): 11

Ratio Th:U = 0.183

Ra-226 (picocuries/gram) 24

EP Tox Metals:

Ag	=	< 0.1
As	=	0.04
Ba	=	0.73
Cd	=	0.01
Cr	=	0.02
Hg	=	< 0.1
Pb	=	< 0.12
Se	=	< 0.1

SOURCE: Australia

Concentrate Type: Scheelite

Initial Concentration WO_3 (%): 71.0

Residue Analysis:

WO_3 (%) : 2.85
% Extraction : 98.2

U (ppm): 1
Th (ppm): 2

Ratio Th:U = 2.0

Ra-226 (picocuries/gram): 0

EP Tox Metals:

Ag	=	< 0.1
As	=	0.04
Ba	=	0.02
Cd	=	0.02
Cr	=	0.20
Hg	=	< 0.1
Pb	=	< 0.12
Se	=	< 0.1

SOURCE: Bolivia

Concentrate Type: Wolframite

Initial Concentration WO_3 (%): 65.5

Residue Analysis:

WO_3 (%) : 2.49
% Extraction : 98.5

U (ppm): 365
Th (ppm): 80

Ratio Th:U = 0.219

Ra-226 (picocuries/gram): 130

EP Tox Metals:

Ag = < 0.1

As = 0.04

Ba = 0.01

Cd = 0.05

Cr = 0.01

Hg = < 0.1

Pb = < 0.12

Se = < 0.1

TABLE I

Radio Chemical Analysis Other Scheelite Residue

Residue	Gross Alpha (pCi/gm)	Gross Beta (pCi/gm)	Radium 226 (pCi/gm)	Radium 228 (pCi/gm)	U_3O_8 (%)	Thorium (%)
Mexican Naica	7.7 ± 2.9	19 ± 10	2.7 ± 1.7	1.8 ± 3.3	< 0.001	< 0.001
Mexican #50684	42 ± 6	48 ± 11	3.9 ± 2.0	4.9 ± 3.7	< 0.001	0.002
Mexican #50685	76 ± 8	110 ± 10	8.4 ± 2.3	16 ± 6	< 0.001	0.003
Mexican #50686	67 ± 7	88 ± 11	7.8 ± 2.5	11 ± 5	< 0.001	.004
Mexican #50687	49 ± 6	75 ± 11	9.5 ± 7.8	3.2 ± 4.1	< 0.001	< .001
GSA #1046	170 ± 30	180 ± 10	33 ± 5	-	.003	.001
GSA Dayton Comp.	-	-	19 ± 4	10 ± 3	.005	.003
GSA Kentucky Brn.	77 ± 19	66 ± 10	6.8 ± 2.0	8.6 ± 6.3	< 0.001	< 0.001
Turkey No. 1	560 ± 50	340 ± 20	77 ± 7	1.6 ± 3.5	.012	.004
GSA - X87	230 ± 30	170 ± 10	31 ± 4	5.2 ± 3.4	.003	-
CTMC GII 50751-61	210 ± 30	180 ± 20	26 ± 4	-	.0078	.0069
CTMC GII 50737-61	68 ± 19	63 ± 12	10 ± 3	-	.0011	.0017
CTMC GII 50751-63	76 ± 70	62 ± 12	11 ± 3	-	.001	.003
Mex. Sonora Float.	37 ± 14	47 ± 9	3.8 ± 1.9	-	.002	.008
Mex. Sonora Gra85	110 ± 20	71 ± 10	7.5 ± 2.5	-	.005	.001
Mex. Sonora Gra86	86 ± 20	61 ± 10	7.3 ± 2.5	-	.005	.002
Mex. Sonora Gra87	110 ± 20	60 ± 10	8.7 ± 2.6	-	.002	.002
Mex. Naica Gra.	11 ± 9	0. ± 5	0. ± 0.6	-	.0011	.001
Mactung Float	26 ± 12	26 ± 12	4.6 ± 1.7	-	< .001	< .001
CTMC GI-2358	18 ± 10	11 ± 5	1.4 ± 1.0	2.5 ± 2.3	< .001	.001
CTMC GII, 5022-01	110 ± 20	100 ± 10R	14 ± 3	-	.005	< .001
CTMC UF2 5015-00	22 ± 11	21 ± 7	1.8 ± 1.2	-	< .001	< .001
French	19 ± 4	28 ± 10	4.6 ± 2.2	1.4 ± 2.8	< .001	< .001
GSA Synth. Comp. 1	30 ± 12	39 ± 7	1.5 ± 1.2	3.7 ± 3.2	.006	< .001
GSA Synth. Comp. 2	11 ± 10	18 ± 8	1.0 ± 1.0	8.3 ± 3.3	.002	< .001

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REFERENCE NO. 33

OFFICE OF THE MAYOR
CITY OF GLEN COVE
NEW YORK 11542

DONALD P. DeRIGGI
MAYOR AND SUPERVISOR

516 - 676-2000

Tony

FEB 2 1990

January 31, 1990

RE: Glen Cove - LiTungsten Site

Gentlemen:

In April of 1989, anhydrous ammonia and other volatile chemicals were found at the above location, together with 32 million pounds of slag containing thorium and other radioactive elements.

The EPA is finishing its emergency removal of the laboratory chemicals, asbestos, PCBs and other elements it has deemed to be part of its mandate. Remaining will be the 32 million pounds of thorium slag. Our concern is that the radioactive elements should be included in the emergency removal plan or should at least be characterized by the DEC as requiring high priority on its removal list.

The Li Tungsten site is located next to Glen Cove Creek which empties into Hempstead Harbor. The 32 million pounds of thorium poses a serious leachate question. Run-off and seepage seem inevitable. It should also be noted that our fire department has expressed great concern about having to enter onto the premises. They have been advised that if there is a fire, or if indeed there are aggravated wind conditions at the location, the radioactive particles will become volatilized and airborne and, therefore, possibly ingested. The EPA has indicated that most of the radioactive elements are being stored within buildings on the premises. These buildings are wooden and in a dilapidated condition. Therefore, the chance of fire is real and the volatilization of the particles is a very serious question.

I, therefore, respectfully request your assistance in securing the removal of the radioactive substances by having this aspect incorporated into the emergency removal plan of EPA or, in the alternative if this is not possible, having Li Tungsten characterized as having high priority on the DEC's list of sites.

Very truly yours

DONALD P. DE RIGGI
Mayor and Supervisor

DPD:dag

ORIGINAL TO R.C. / COPY TO [illegible]STELLA — copies to: A. Oro[illegible] B. CONETTA

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233 7010

JUN 4 1990

Thomas C. Jorling
Commissioner

Mr. Stephen Luftig
Director
Emergency and Remedial Response Division
USEPA Region II
26 Federal Plaza
New York, New York 10278

Dear Mr. Luftig:

Re: Site Code #130046
Li Tungsten, Glen Cove
Nassau County

Thank you for your expert assistance as lead agency during the recent PRP remedial efforts at the referenced site. This is yet another example of how EPA's timely response and cooperation are helping to clean up and remediate sites, such as this, to the benefit of all.

As you are aware, radioactive contamination is not a hazardous waste in New York State and the New York State Department of Environmental Conservation (NYSDEC), therefore, cannot use State Superfund money to address the problem of the remaining radioactive slag. This site is a Class 2 site on our registry (significant threat to public health or environment) due to other contaminants. It is not scheduled in our program in the immediate future.

The enclosed letter from the City of Glen Cove Mayor and Supervisor, Mr. Donald Riggi, explains the grave concern of the residents of Glen Cove regarding the Li Tungsten site. The NYSDEC, therefore, requests that the USEPA remain as lead agency at the site until such time as the problem of the radioactive contaminated slag is solved.

If you have any questions regarding this request, please contact [illegible] Rockmore, P.E., of my staff at (518) 457-9280.

Sincerely,

for Charles N. Goddard

Michael J. O'Toole, Jr., P.E.
Director
Division of Hazardous Waste Remediation

Enclosure
cc: R. Tramontano - NYSDOH
K. Rimawi - NYSDOH
R. Salkie - USEPA Region II

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REFERENCE NO. 34

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
EDISON, NEW JERSEY 08837

AUG 15 1989

Mr. Michael J. O'Toole, Jr., P.E.
Director
Division of Hazardous Waste Remediation
New York State Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233

Dear Mr. O'Toole:

This is in reply to your April 14, 1989, request for a CERCLA removal action at the Li Tungsten Site in Glen Cove, Nassau County, New York. Mr. Charles Fitzsimmons, of the Response and Prevention Branch, was assigned as the On-Scene Coordinator (OSC) for this site.

A preliminary assessment and removal site inspection was conducted on April 16, 1989, and also April 26 through April 28, 1989. Based on the findings of this inspection, we determined that there is a substantial threat of release of hazardous substances as described under Section 104 of CERCLA, as amended by SARA. As a result of this determination, negotiations were initiated between the Primary Responsible Party (Old Court Savings and Loan) and EPA's Office of Regional Counsel. On June 30, 1989, an agreement was reached.

This Consent Order requires the responsible party to remove all hazardous substances as regulated by CERCLA, RCRA and the CWA. The large quantity of slag material bearing above background levels of select radionuclides will have to be addressed under the State's remedial program. The responsible party will provide a short term mitigative fix by stabilizing these piles.

Should you have any questions or require additional information, please have your staff contact Mr. Fitzsimmons at (201) 321-6608.

Sincerely yours,

Steph D. Luftig

Stephen D. Luftig, Director
Emergency and Remedial Response Division

cc: R. Salkie, 2ERR-ADREPP
B. Sprague, 2ERR-RPB
C. Fitzsimmons, 2ERR-RPB

REFERENCE NO. 35

FEB 7 1990

Mr. Michael J. O'Toole, Jr., P.E.
Director
Division of Hazardous Waste Remediation
New York State Department of Environmental
Conservation
50 Wolf Road
Albany, New York 12233

Dear Mr. O'Toole:

This is in regard to the Li Tungsten, Glen Cove, Long Island time critical removal action presently being performed by the Responsible Party under a Section 106 Order on Consent. As you are aware, field activities have been ongoing since this agreement was reached on June 30, 1989, as described in my letter to you dated August 15, 1989 (attached).

A great deal of site stabilization and clean-up activity has taken place since the initiation of the removal action. However, it is anticipated that the removal action, as described in the above order, will come to a conclusion on or about February 10, 1990. Shortly thereafter, a final report from the Responsible Party should be completed and submitted to EPA. As you are also aware this site is not listed on the National Priorities List (NPL) and nomination for such may not occur until sometime in 1991, after the new EPA hazard ranking system is finalized.

Mr. Charles Fitzsimmons, On-Scene Coordinator of my staff, would like to coordinate a meeting with members of your staff to effect a smooth transition of overall site leadership. This meeting would also serve to provide an update on the present site conditions, specifically with regard to the large quantity of radioactive slag material, that remains on-site.

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Dick Salkie or Mr. Fitzsimmons will be contacting Al Rochmore to arrange this discussion. Should you have additional questions on this transition, please contact Mr. Fitzsimmons at 201-321-6608 or myself.

Sincerely yours,

Stephen D. Luftig, Director
Emergency and Remedial Response Division

cc: R. Salkie, 2ERR-ADREPP
B. Sprague, 2ERR-RPB
C. Fitzsimmons, 2ERR-RPB
J. Doyle, ORC-NYCSUP
M. Hauptman, ERRD-SC
A. Hess, ERRD-SC
A. Fellman, AWM-RAD

Left on site

final report just received by EPA

16,000+ tons - piles and drums

Low level RAD facility

High level - was removed - not immediately dangerous

DOH STATE OF NEW YORK
DEPARTMENT OF HEALTH
Corning Tower The Governor Nelson A. Rockefeller Empire State Plaza · Albany, New York 12237

David Axelrod, M.D.
Commissioner

OFFICE OF PUBLIC HEALTH
Linda A. Randolph, M.D., M.P.H.
Director
William F. Leavy
Executive Deputy Director

March 9, 1990

Mr. Michael J. O'Toole, Jr. P.E., Director
Division of Hazardous Waste Remediation
NYS Department of Environmental Conservation
50 Wolf Road
Albany, NY 12233

Dear Mr. O'Toole:

We recently received a copy of a letter dated February 7, 1990 to you from Stephen Luftig of EPA relative to the LI Tungsten site in Glen Cove, NY. In the letter, EPA asked for a meeting to effect a transition of overall site leadership.

We would like to be included in any such meeting due to the concerns about the large quantities of radioactive materials on this site. Please contact me or William Condon at 458-6461 if you have any questions.

Sincerely,

Karim Rimawi

Karim Rimawi, Ph.D.
Director
Bureau of Environmental Radiation
Protection

RECEIVED
MAR 12 1990
DIVISION OF HAZARDOUS WASTE REMEDIATION

cc: Dr. Hetling
Dr. Merges
Mr. Condon

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